

EXERCISES 2.1

**Solution Manual for College Algebra 12th Edition by
Gustafson and Hughes ISBN 1305652231 9781305652231**

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Exercises 2.1 (page 201)

1. function
2. relation
3. domain
4. range
5. $C \subseteq O \cup B$
6. B
7. dependent
8. difference quotient
9. $D \subseteq \{e, \#, \$, \%, \& \}$; $R \subseteq \{e, \$, \%, \&, \# \}$
Each element of the domain is paired with only one element of the range. Function.
10. $D \subseteq \{e, \#, (,) \}$; $R \subseteq \{e, \# \}$
Each element of the domain is paired with only one element of the range. Function.
11. $D \subseteq \{e, \#, \& \}$; $R \subseteq \{e, \$, \%, \&, \# \}$
" is both paired with \$ and %. Not a function.
12. $D \subseteq \{e, \#, ! \}$; $R \subseteq \{e, \#, " \}$
! is both paired with " and \$. Not a function.
13. $D \subseteq \{LSU, Georgia, MSU, Auburn \}$; $R \subseteq \{Tigers, Bulldogs \}$
Each element of the domain is paired with only one element of the range. Function.
14. $D \subseteq \{Jackson, Louisiana, Mississippi, Tennessee, Alexandria, Virginia \}$; $R \subseteq \{Jackson, Louisiana, Mississippi, Tennessee, Virginia \}$
Jackson is paired with Louisiana, Mississippi, and Tennessee. Not a function.
15. $D \subseteq \{76, September 9, October 12, May 10, June 1 \}$; $R \subseteq \{September 9, October 12, May 10, June 1 \}$
76 is paired with September 9 and October 12. Not a function.
16. $D \subseteq \{Architect, \$73,090, Dentist, \$149,310, Microbiologist, \$66,260, Actuary, \$93,680 \}$

EXERCISES 21
D œ eArchitect, Dentist, Microbiologist, Actuary, R œ e\$73,090, \$149,310, \$66,260, \$93,680f

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- Each element of the domain is paired with only one element of the range. Function.
17. $C \subseteq B$
 Each value of B is paired with only one value of C .
function
18. $C \# B \subseteq !$
 $C \subseteq \#B$
 Each value of B is paired with only one value of C .
function
19. $C \# \subseteq B$
 $C \subseteq \# \bar{B}$
 At least one value of B is paired with more than one value of C . **not a function**
20. $C \# \%B \subseteq "$
 $C \# \subseteq \%B "$

 $C \subseteq \# \bar{\%B} "$
 At least one value of B is paired with more than one value of C . **not a function**
21. $C \subseteq B \#$
 Each value of B is paired with only one value of C .
function
22. $C " \subseteq \&B \S$
 Each value of B is paired with only one value of C .
function

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23. $kCk \subseteq B$
 $C \subseteq \text{,, } B$
 At least one value of B is
 paired with more than one
 value of C . **not a function**
24. $\#kCk \subseteq B \%$
 $kCk \subseteq \frac{B\%}{\#}$
 $C \subseteq \text{,, } \frac{B\%}{\#}$
 At least one value of B is
 paired with more than one
 value of C . **not a function**
25. $kB \#k \subseteq C$
 $C \subseteq kB \#k$
 Each value of B is paired
 with only one value of C .
function
26. $C kBk \subseteq \$$
 $C \subseteq kBk \$$
 Each value of B is paired
 with only one value of C .
function
27. $kBk \subseteq kCk$
 $kCk \subseteq kBk$
 $C \subseteq \text{,, } kBk$
 At least one value of B is
 paired with more than one
 value of C . **not a function**
28. $kCk \subseteq kB \#k$
 $C \subseteq \text{,, } B \#$
 At least one value of B is
 paired with more than one
 value of C . **not a function**
29. $C \subseteq (;$ Each value of B is paired with
 only one value of C . **function**
30. $B \subseteq (;$ At least one value of B is paired with
 more than one value of C . **not a function**
31. $C (\subseteq \hat{E}B^-$
 $C \subseteq \hat{E}B^- ($
 Each value of B is paired with only one
 value of C . **function**
32. $C \hat{E}B^- \subseteq)$
 $C \subseteq \hat{E}B^-)$
 Each value of B is paired with only one
 value of C . **function**
33. $B^s C^{\#} \subseteq \# \&$
 $C^{\#} \subseteq B^s \# \&$
 $C \subseteq \text{,, } \sqsupset B^s \# \&$
 At least one value of B is paired with
 more than one value of C . **not a function**
34. $B \text{ " } \# C^{\#} \subseteq \text{''}$
 $C^{\#} \subseteq \text{'' } B \text{ " } \#$

 $C \subseteq \text{,, } \hat{E} \text{'' } B \text{ " } \#$
 At least one value of B is paired with
 more than one value of C . **not a function**
35. $0 B \subseteq \$B \& \hat{E}$ domain $\subseteq \infty, \infty$
36. $0 B \subseteq \&B \# \hat{E}$ domain $\subseteq \infty, \infty$
37. $0 B \subseteq B \# B \text{ " } \hat{E}$ domain $\subseteq \infty, \infty$
38. $0 B \subseteq B^s \$B \# \hat{E}$ domain $\subseteq \infty, \infty$
39. $0 B \subseteq \hat{E}B \# \hat{E} B \# \epsilon !$
 domain $\subseteq c\#, \infty$
40. $0 B \subseteq \hat{E} \# B \$ \hat{E} \# B \$ \epsilon !$
 domain $\subseteq \text{'' } , \infty$
 #
41. $0 B \subseteq \hat{E}\% B \hat{E} \% B \epsilon !$
 domain $\subseteq \infty \uparrow \% \downarrow$
42. $0 B \subseteq \$ \hat{E} \# B \hat{E} \# B \epsilon !$
 domain $\subseteq \infty \uparrow \# \downarrow$

43. $\exists B \subseteq \mathbb{R} \text{ s.t. } \hat{B} \cap B = \emptyset$
 domain $\mathbb{R}, \mathbb{R} \cup \{\infty\}$

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 44. $\exists B \subseteq \mathbb{R} \text{ s.t. } \hat{B} \cap B \neq \emptyset$
 domain $\mathbb{R}, \mathbb{R} \cup \{\infty\}$

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45. $0 B \in \overline{B} \hat{=} \text{domain } \infty, \infty$ 46. $0 B \in \overline{B \&} \hat{=} \text{domain } \infty, \infty$

47. $0 B \in \overline{\$} \hat{=} B \text{ \AA } "$ 48. $0 B \in \overline{C} \hat{=} B \text{ \AA } \$$

$\text{domain } \infty, " \cup ", \infty$

$\text{domain } \infty, \$ \cup \$, \infty$

49. $0 B \in \overline{B} \hat{=} B \text{ \AA } \$$ 50. $0 B \in \overline{B\#} \hat{=} B \text{ \AA } "$

$\text{domain } \infty, \$ \cup \$, \infty$

$\text{domain } \infty, " \cup ", \infty$

51. $0 B \in \overline{B} \in \overline{B}$

52. $0 B \in \overline{\#B} \in \overline{\#B}$

$B\# \% \quad B \# B \#$

$B\# * \quad B \$ B \$$

$B \text{ \AA } \#, B \text{ \AA } \#$
 $\text{domain } \infty, \# \cup \#, \# \cup \#, \infty$

$B \text{ \AA } \$, B \text{ \AA } \$$
 $\text{domain } \infty, \$ \cup \$, \$ \cup \$, \infty$

53. $0 B \in \overline{''} \in \overline{''}$

54. $0 B \in \overline{B} \in \overline{B}$

$B\# \%B \& \quad B " B \&$
 $B \text{ \AA } ", B \text{ \AA } \&$
 $\text{domain } \infty, " \cup ", \& \cup \&, \infty$

$\#B\# \quad ""B \$! \quad \# B \$ B \&$
 $B \text{ \AA } \$, B \text{ \AA } \&$
 $\text{domain } \infty, \$ \cup \$, \& \cup \&, \infty$

55. $0 B \in k B \$ \hat{=} \text{domain } \infty, \infty$ 56. $0 B \in \#k B "k \hat{=} \text{domain } \infty, \infty$

57. $0 B \in \$B \#$

$0 \# \in \$ \# \#$ $\in ' \#$ $\in \%$	$0 \$ \in \$ \$ \#$ $\in * \#$ $\in ""$	$0 5 \in \$ 5 \#$	$0 \hat{5} \# \quad "" \in \hat{5} \# \quad "" \#$ $\in \$ \# \$ \#$ $\in \$ \# \&$
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58. $0 B \in \&B ($

$0 \# \in \& \# ($ $\in " ! ($ $\in "($	$0 \$ \in \& \$ ($ $\in "& ($ $\in)$	$0 5 \in \& 5 ($	$0 \hat{5} \# \quad "" \in \hat{5} \# \quad "" ($ $\in \& 5 \# \& ($ $\in \& 5 \# \#$
---	---	------------------	---

59. $0 B \in " B \$$

$0 \# \in \# \$$ $\in " \$$ $\in \%$	$0 \$ \in \$ \$$ $\in \$ \#$ $\in \$ \#$	$0 5 \in 5 \$$	$0 \hat{5} \# \quad "" \in \hat{5} \# \quad "" \$$ $\in " 5 \# " \$$ $\in \# 5 \# \#$
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60. $0 B \in \# B \&$

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0 # œ # # &	0 \$ œ # \$ &	0 5 œ # 5 &	0 5 # " œ # 5 # " &
œ % &	œ # &		œ # 5 # # &
œ * \$	œ \$		œ # 5 # \$ \$

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61. O B œ B#

O # œ ## œ %	O \$ œ \$ # œ *	O 5 œ 5#	O ^5# "œ ^5# "œ # œ ^5# "œ ^5# "œ # œ 5% #5# "
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62. O B œ \$ B#

O # œ \$ ## œ \$ % œ "	O \$ œ \$ \$ # œ \$ * œ "	O 5 œ \$ 5#	O ^5# "œ \$ ^5# "œ # œ \$ ^5# "œ ^5# "œ # œ \$ ^5% #5# "œ # œ 5% #5# #
------------------------------	---------------------------------	-------------	---

63. O B œ B# \$B "

O # œ ## \$ # " œ % " " œ *	O \$ œ \$ # \$ \$ " œ * * " œ "	O 5 œ 5# \$5 "
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O ^5# "œ ^5# "œ # \$ ^5# "œ # œ 5% #5# " \$5# \$ " œ 5% 5# \$

64. O B œ B# #B "

O # œ # # # # " œ % % " œ (O \$ œ \$ # # \$ " œ * ' " " œ #	O 5 œ 5# #5 "
-----------------------------------	--	---------------

O ^5# "œ ^5# "œ # # ^5# "œ # œ 5% #5# " #5# \$ œ 5% #

65. O B œ Bs #

O # œ # \$ # œ) # œ '	O \$ œ \$ \$ # œ # (# œ # *	O 5 œ 5 \$ #	O ^5# "œ ^5# "œ # œ ^5# "œ ^5# "œ # œ 5' \$5% \$5# " # œ 5' \$5% \$5# \$
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EXERCISES 2.1

66.

0 B œ Bs

$0 \# \text{œ} \hat{\#}^{\%}$ $\text{œ})$	$0 \$ \text{œ} \$^{\$}$ $\text{œ} \#($ $\text{œ} \#($	$0 5 \text{œ} 5^{\$}$ $\text{œ} 5^{\$}$	$0 \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#}$ $\text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#}$ $\text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#}$ $\text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#}$
---	---	--	---

67.

0 B œ ,B# "

$0 \# \text{œ} ,\# \# "$ $\text{œ} k\&k$ $\text{œ} \&$	$0 \$ \text{œ} , \$ \# "$ $\text{œ} k"!k$ $\text{œ} "!$	$0 5 \text{œ} ,5\# "$ $\text{œ} 5\# "$ $\square 5\# " \text{€} !'$	$0 \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#}$ $\text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#}$ $\text{œ} 5\% \#5\# " "$ $\text{œ} 5\% \#5\# \#$ $\text{œ} 5\% \#5\# \#$ $\text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#}$
--	---	--	--

68.

0 B œ ,B# B %

$0 \# \text{œ} ,\# \# \# \%$ $\text{œ} k\% \# \%k$ $\text{œ} k"!k$ $\text{œ} "!$	$0 \$ \text{œ} , \$ \# \$ \%$ $\text{œ} k^* \$ \%k$ $\text{œ} k"!k$ $\text{œ} "!$	$0 5 \text{œ} ,5\# 5\%$ $\text{œ} 5\# 5\%$ $\square 5\# 5\% \text{€} !'$
---	--	--

$0 \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#}$ $\text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#}$ $\text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#}$ $\text{œ} 5\% \#5\# " 5\# \$$ $\text{œ} 5\% 5\% \%$ $\text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#} \text{œ} \hat{5}^{\#}$

69.

0 B œ $\frac{\#}{\#}$

$0 \# \text{œ} \frac{\#}{\#}$ $\frac{\#}{\#} \%$ $\text{œ} \frac{\#}{\#} \text{œ} \frac{\#}{\#}$	$0 \$ \text{œ} \frac{\#}{\#}$ $\frac{\#}{\#} \%$ $\text{œ} \frac{\#}{\#} \text{œ} \frac{\#}{\#}$	$0 5 \text{œ} \frac{\#}{5\%}$	$0 \hat{5}^{\#} \text{œ} \frac{\#}{5\#} \text{œ} \frac{\#}{5\#} \text{œ} \frac{\#}{5\#}$
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EXERCISES 2.1

70. $0 B \text{ œ } \frac{\$}{\text{---}}$

$0 \# \text{ œ } \frac{\$}{\# \&}$ $\text{œ } \frac{\$}{\$} \text{ œ } "$	$0 \$ \text{ œ } \frac{\$}{\$ \&}$ $\text{œ } \frac{\$}{\text{---}} \text{ œ } \frac{\$}{\text{---}}$	$0 5 \text{ œ } \frac{\$}{5 \&}$	$0^{\wedge} 5 \# \text{ "" œ } \frac{\$}{5 \# " \&}$ $\text{œ } \frac{\$}{5 \# "}$
--	--	----------------------------------	---

71. $0 B \text{ œ } \frac{''}{B \# ''}$

$0 \# \text{ œ } \frac{\# \# ''}{''}$ $\text{œ } \frac{\% ''}{''}$ $\text{œ } \$$	$0 \$ \text{ œ } \frac{\$ \# ''}{''}$ $\text{œ } \frac{''}{''}$ $\text{œ } \frac{''}{''}$ $\text{œ })$	$0 5 \text{ œ } \frac{B \# ''}{5 \# ''}$	$0^{\wedge} 5 \# \text{ "" œ } \frac{''}{5 \# " \# ''}$ $\text{œ } \frac{''}{5 \% \# 5 \# " ''}$ $\text{œ } \frac{''}{5 \% \# 5 \#}$
---	--	--	--

72. $0 B \text{ œ } \frac{\$}{\text{---}}$

$0 \# \text{ œ } \frac{\$}{\# \# \$}$ $\text{œ } \frac{\% \$}{\$}$ $\text{œ } ($	$0 \$ \text{ œ } \frac{\$}{\$ \# \$}$ $\text{œ } \frac{\$}{\$}$ $\text{œ } \frac{\% \$}{\$}$ $\text{œ } \frac{\$}{\#} \text{ œ } \%$	$0 5 \text{ œ } \frac{\$}{5 \# \$}$	$0^{\wedge} 5 \# \text{ "" œ } \frac{\$}{5 \# " \# \$}$ $\text{œ } \frac{\$}{5 \% \# 5 \# " \$}$ $\text{œ } \frac{\$}{5 \% \# 5 \%}$
--	---	-------------------------------------	--

73. $0 B \text{ œ } \frac{''}{\text{E} \# ''}$

$0 \# \text{ œ } \frac{''}{\text{E} \# ''}$ $\text{œ } \frac{\% ''}{\text{E} \&}$ $\text{œ } \text{E} \&$	$0 \$ \text{ œ } \frac{''}{\text{E} \$ \# ''}$ $\text{œ } \frac{''}{\text{E} * ''}$ $\text{œ } \text{E} !$	$0 5 \text{ œ } \frac{''}{\text{E} 5 \# ''}$	$0^{\wedge} 5 \# \text{ "" œ } \frac{''}{\text{E} 5 \# " \# ''}$ $\text{œ } \frac{''}{\text{E} 5 \% \# 5 \# " ''}$ $\text{œ } \frac{''}{\text{E} 5 \% \# 5 \# \#}$
---	--	--	--

74. $0 B \text{ œ } \frac{''}{\text{E} \# ''}$

$0 \# \text{ œ } \frac{''}{\text{E} \# ''}$ $\text{œ } \frac{''}{\text{E} \% ''}$ $\text{œ } \text{E} \$$	$0 \$ \text{ œ } \frac{''}{\text{E} \$ \# ''}$ $\text{œ } \frac{''}{\text{E} * ''}$ $\text{œ } \text{E}) \text{ œ } \# \text{E} \#$	$0 5 \text{ œ } \frac{''}{\text{E} 5 \# ''}$	$0^{\wedge} 5 \# \text{ "" œ } \frac{''}{\text{E} 5 \# " \# ''}$ $\text{œ } \frac{''}{\text{E} 5 \% \# 5 \# " ''}$ $\text{œ } \frac{''}{\text{E} 5 \% \# 5 \#}$ $\text{œ } \frac{''}{\text{E} 5 \# 5 \# \#}$ $\text{œ } k 5 \text{E} 5 \# \#$
---	--	--	---

75. $0 B \text{ œ } \frac{''}{\text{E} \# ''}$

$0 \# \text{ œ } \frac{''}{\text{E} \# ''}$	$0 \$ \text{ œ } \frac{''}{\text{E} \$ \# ''}$ $\text{œ } \frac{''}{\text{E} \$ ''}$	$0 5 \text{ œ } \frac{''}{\text{E} 5 \# ''}$	$0^{\wedge} 5 \# \text{ "" œ } \frac{''}{\text{E} 5 \# " ''}$
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76.

$0 B \alpha \overline{E B} "$

$0 \# \alpha \overline{E \#} "$ $\alpha \overline{E \#}$	$0 \$ \alpha \overline{E \$} "$ $\alpha \overline{E \#}$ $\alpha \overline{E \#}$	$0 5 \alpha \overline{E 5} "$	$0^{\wedge} 5 \# " \alpha \overline{E 5 \#} "$ $\alpha \overline{E 5 \#}$
---	---	-------------------------------	--

77.

$$\frac{0 B \quad 2 \quad 0 B}{2} \alpha \frac{c \$ B \quad 2 \quad "d \quad c \$ B \quad "d}{2} \alpha \frac{c \$ B \quad \$ 2 \quad "d \quad c \$ B \quad "d}{2} \alpha \frac{\$ B \quad \$ 2 \quad " \quad \$ B \quad "}{2} \alpha \frac{\$ 2}{2} \alpha \$$$

78.

$$\frac{0 B \quad 2 \quad 0 B}{2} \alpha \frac{c \& B \quad 2 \quad "d \quad c \& B \quad "d}{2} \alpha \frac{c \& B \quad \& 2 \quad "d \quad c \& B \quad "d}{2} \alpha \frac{\& B \quad \& 2 \quad " \quad \& B \quad "}{2} \alpha \frac{\& 2}{2} \alpha \&$$

79.

$$\frac{0 B \quad 2 \quad 0 B}{2} \alpha \frac{c (B \quad 2 \quad)d \quad c (B \quad)d}{2} \alpha \frac{c (B \quad (2 \quad)d \quad c (B \quad)d}{2} \alpha \frac{(B \quad (2 \quad) \quad (B \quad)}{2} \alpha \frac{(2)}{2} \alpha ($$

80.

$$\frac{0 B \quad 2 \quad 0 B}{2} \alpha \frac{c) B \quad 2 \quad "d \quad c) B \quad "d}{2} \alpha \frac{c) B \quad) 2 \quad "d \quad c) B \quad "d}{2} \alpha \frac{) B \quad) 2 \quad " \quad) B \quad "}{2} \alpha \frac{) 2}{2} \alpha)$$

81.

$$\frac{0 B \quad 2 \quad 0 B}{2} \alpha \frac{c \# B \quad 2 \quad \# \quad " \quad c B \#}{2} \alpha \frac{\# \quad \# \quad \#}{2} \alpha \frac{c B \quad \# B 2 \quad 2 \quad "d \quad c B \quad "d}{2} \alpha \frac{B \# \quad \# B 2 \quad 2 \quad \# \quad B \# \quad "}{2} \alpha \frac{\# B 2 \quad 2 \# \quad 2 \quad \# B \quad 2}{2} \alpha \frac{c \# B \quad 2}{2} \alpha \# B \quad 2$$

82.

$$\frac{0 B \quad 2 \quad 0 B}{2} \alpha \frac{c \# B \quad 2 \quad \# \quad \$ \quad c B \# \quad \$ d}{2} \alpha \frac{c B \# \quad \# B 2 \quad 2 \# \quad \$ d \quad c B \# \quad \$ d}{2} \alpha \frac{B \# \quad \# B 2 \quad 2 \# \quad \$ \quad B \# \quad \$}{2} \alpha \frac{\# B 2 \quad 2 \# \quad 2 \quad \# B \quad 2}{2} \alpha \frac{c \# B \quad 2}{2} \alpha \frac{c \# B \quad 2}{2} \alpha \# B \quad 2$$

83.

$$\frac{0 B \quad 2 \quad 0 B}{2} \alpha \frac{c \% B \quad 2 \quad \# \quad \# \quad c \% B \#}{2} \alpha \frac{\# \quad \# \quad \#}{2} \alpha \frac{c \% B \quad) B 2 \quad \% 2 \quad "d \quad c \% B \quad "d}{2} \alpha \frac{c \% B \quad 2}{2} \alpha \frac{c \% B \quad 2}{2} \alpha \# B \quad 2$$

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$$\frac{a}{2} \quad \frac{a}{2} \quad a$$

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84.
$$\frac{0 \ B \ 2 \ 0 \ B}{2} \quad \frac{\& \ B \ 2 \ # \ \$ \ ^{\circ} \ c \ \& \ B \ #}{\text{œ}}$$

$$\frac{\# \ # \ #}{\text{œ}} \quad \frac{c \ \& \ B \ \! \ B \ 2 \ \& \ 2 \ \$ \ d \ c \ \& \ B \ \$ \ d}{\text{œ}}$$

$$\frac{\& \ B \ # \ \! \ B \ 2 \ \& \ 2 \ # \ \$ \ \& \ B \ # \ \$}{\text{œ}}$$

$$\frac{\! \ B \ 2 \ \& \ 2 \ # \ \quad \quad \quad \frac{2}{2} \ \! \ B \ \& \ 2}{\text{œ} \quad \quad \quad \text{œ} \quad \quad \quad \text{œ} \ \! \ B \ \& \ 2}$$

85.
$$\frac{0 \ B \ 2 \ 0 \ B}{2} \quad \frac{\square \ B \ 2 \ # \ \$ \ B \ 2 \ (\ ^{\circ} \ c \ B \ # \ \$ \ B \ (\ d}{\text{œ}}$$

$$\frac{c \ B \ # \ \# \ B \ 2 \ # \ \$ \ B \ 2 \ \$ \ 2 \ (\ d \ c \ B \ # \ \$ \ B \ (\ d}{\text{œ}}$$

$$\frac{B \ # \ \# \ B \ 2 \ # \ \$ \ B \ \$ \ 2 \ (\ B \ # \ \$ \ B \ (}{\text{œ}}$$

$$\frac{\# \ B \ 2 \ # \ \$ \ 2 \ \quad \quad \quad \frac{2}{2} \ \# \ B \ 2 \ \$}{\text{œ} \quad \quad \quad \text{œ} \quad \quad \quad \text{œ} \ \# \ B \ 2 \ \$}$$

86.
$$\frac{0 \ B \ 2 \ 0 \ B}{2} \quad \frac{\square \ B \ 2 \ # \ \& \ B \ 2 \ \! \ ^{\circ} \ c \ B \ # \ \& \ B \ \! \ d}{\text{œ}}$$

$$\frac{c \ B \ # \ \# \ B \ 2 \ # \ \& \ B \ 2 \ \& \ 2 \ \! \ d \ c \ B \ # \ \& \ B \ \! \ d}{\text{œ}}$$

$$\frac{B \ # \ \# \ B \ 2 \ # \ \& \ B \ \& \ 2 \ \! \ B \ # \ \& \ B \ \!}{\text{œ}}$$

$$\frac{\# \ B \ 2 \ # \ \& \ 2 \ \quad \quad \quad \frac{2}{2} \ \# \ B \ 2 \ \&}{\text{œ} \quad \quad \quad \text{œ} \quad \quad \quad \text{œ} \ \# \ B \ 2 \ \&}$$

87.
$$\frac{0 \ B \ 2 \ 0 \ B}{2} \quad \frac{\square \ # \ B \ 2 \ # \ \% \ B \ 2 \ \# \ ^{\circ} \ c \ # \ B \ # \ \% \ B \ \# \ d}{\text{œ}}$$

$$\frac{c \ # \ B \ # \ \% \ B \ 2 \ \# \ 2 \ # \ \% \ B \ \% \ 2 \ \# \ d \ c \ # \ B \ # \ \% \ B \ \# \ d}{\text{œ}}$$

$$\frac{\# \ B \ # \ \% \ B \ 2 \ \# \ 2 \ # \ \% \ B \ \% \ 2 \ \# \ \# \ B \ # \ \% \ B \ \#}{\text{œ}}$$

$$\frac{\% \ B \ 2 \ \# \ 2 \ # \ \% \ 2 \ \quad \quad \quad \frac{2}{2} \ \% \ B \ 2 \ \%}{\text{œ} \quad \quad \quad \text{œ} \quad \quad \quad \text{œ} \ \% \ B \ \# \ 2 \ \%}$$

88.
$$\frac{0 \ B \ 2 \ 0 \ B}{2} \quad \frac{\square \ \$ \ B \ 2 \ # \ \# \ B \ 2 \ \$ \ ^{\circ} \ c \ \$ \ B \ # \ \# \ B \ \$ \ d}{\text{œ}}$$

$$\frac{c \ \$ \ B \ # \ \! \ B \ 2 \ \$ \ 2 \ # \ \# \ B \ \# \ 2 \ \$ \ d \ c \ \$ \ B \ # \ \# \ B \ \$ \ d}{\text{œ}}$$

$$\frac{\$ \ B \ # \ \! \ B \ 2 \ \$ \ 2 \ # \ \# \ B \ \# \ 2 \ \$ \ \$ \ B \ # \ \# \ B \ \$}{\text{œ}}$$

$$\frac{\! \ B \ 2 \ \$ \ 2 \ # \ \# \ 2 \ \quad \quad \quad \frac{2}{2} \ \! \ B \ \$ \ 2 \ \#}{\text{œ} \quad \quad \quad \text{œ} \quad \quad \quad \text{œ} \ \! \ B \ \$ \ 2 \ \#}$$

EXERCISES 2.1

89. $\frac{0 \ B \ 2 \ 0 \ B}{2} \ \text{œ} \ \frac{B \ 2 \ # \ B \ 2 \ \$ \ ' \ c \ B \ # \ B \ \$ \ d}{2}$
 $\text{œ} \ \frac{c \ B \ # \ # \ B \ 2 \ # \ B \ 2 \ \$ \ d \ c \ B \ # \ B \ \$ \ d}{2}$
 $\text{œ} \ \frac{B \ # \ # \ B \ 2 \ # \ B \ 2 \ \$ \ B \ # \ B \ \$}{2}$
 $\text{œ} \ \frac{\# \ B \ 2 \ # \ 2 \ 2 \ # \ B \ 2 \ ''}{2} \ \text{œ} \ \frac{2 \ # \ B \ 2 \ ''}{2} \ \text{œ} \ \# \ B \ 2 \ ''$
90. $\frac{0 \ B \ 2 \ 0 \ B}{2} \ \text{œ} \ \frac{\square \ \$ \ B \ 2 \ # \ \& \ B \ 2 \ '' \ ' \ c \ \$ \ B \ # \ \& \ B \ '' \ d}{2}$
 $\text{œ} \ \frac{c \ \$ \ B \ # \ ' \ B \ 2 \ \$ \ 2 \ # \ \& \ B \ \& \ 2 \ '' \ d \ c \ \$ \ B \ # \ \& \ B \ '' \ d}{2}$
 $\text{œ} \ \frac{\$ \ B \ # \ ' \ B \ 2 \ \$ \ 2 \ # \ \& \ B \ \& \ 2 \ '' \ \$ \ B \ # \ \& \ B \ ''}{2}$
 $\text{œ} \ \frac{' \ B \ 2 \ \$ \ 2 \ # \ \& \ 2 \ 2 \ ' \ B \ \$ \ 2 \ \&}{2} \ \text{œ} \ \frac{2 \ ' \ B \ \$ \ 2 \ \&}{2} \ \text{œ} \ ' \ B \ \$ \ 2 \ \&$
91. $\frac{0 \ B \ 2 \ 0 \ B}{2} \ \text{œ} \ \frac{B \ 2 \ \$ \ B \ \$}{2} \ \text{œ} \ \frac{c \ B \ \$ \ \$ \ B \ # \ 2 \ \$ \ B \ 2 \ # \ 2 \ \$ \ d \ c \ B \ \$ \ d}{2}$
 $\text{œ} \ \frac{\$ \ B \ # \ 2 \ \$ \ B \ 2 \ # \ 2 \ \$}{2}$
 $\text{œ} \ \frac{2 \ \$ \ B \ # \ \$ \ B \ 2 \ 2 \ #}{2} \ \text{œ} \ \$ \ B \ \$ \ B \ 2 \ 2 \ #$
92. $\frac{0 \ B \ 2 \ 0 \ B}{2} \ \text{œ} \ \frac{B \ 2 \ \$ \ B \ \$}{2} \ \text{œ} \ \frac{c \ B \ \$ \ \$ \ B \ # \ 2 \ \$ \ B \ 2 \ # \ 2 \ \$ \ d \ B \ \$}{2}$
 $\text{œ} \ \frac{\$ \ B \ # \ 2 \ \$ \ B \ 2 \ # \ 2 \ \$}{2}$
 $\text{œ} \ \frac{2 \ \$ \ B \ # \ \$ \ B \ 2 \ 2 \ #}{2} \ \text{œ} \ \$ \ B \ \$ \ B \ 2 \ 2 \ #$
93. $\frac{0 \ B \ 2 \ 0 \ B}{2} \ \text{œ} \ \frac{\hat{B} \ 2 \ \hat{B}}{2} \ \text{œ} \ \frac{\hat{B} \ 2 \ \hat{B}}{2} \ \text{œ} \ \frac{2 \ \dagger \ B \ B \ 2}{B \ 2 \ B \ 2} \ \text{œ} \ \frac{2}{B \ 2 \ B \ 2} \ \text{œ} \ \frac{''}{B \ B \ 2}$
94. $\frac{0 \ B \ 2 \ 0 \ B}{2} \ \text{œ} \ \frac{\hat{B} \ 2 \ \hat{B}}{2}$
95. $0 \ B \ \text{œ} \ ! \ \dagger \ B \ '' \ \$ \ #$
 $0 \ \# \ \& \ \text{œ} \ ! \ \dagger \ \# \ \& \ '' \ \$ \ # \ \text{œ} \ '' \ ($
96. $J \ G \ \text{œ} \ \frac{*}{\&} \ G \ \$ \ #$
 $J \ ! \ \text{œ} \ \frac{*}{\&} \ ! \ \$ \ # \ J \ \% \ \text{œ} \ \frac{*}{\&} \ \% \ \$ \ # \ J \ '' \ \text{œ} \ \frac{*}{\&} \ '' \ \$ \ #$
 $\text{œ} \ \$ \ # \ \text{œ} \ \% \ \text{œ} \ \& \ !$

EXERCISES 2.1

97. $\begin{aligned} &= > \text{œ} \text{ " " } > \# \text{ " ! } > \text{ \$! ! } \\ &= \$ \text{ œ} \text{ " " } \$ \# \text{ " ! } \$ \$! ! \text{ œ} \text{ " " } \text{ ' ft} \end{aligned}$
98. $\begin{aligned} &@ > \text{œ} \text{ \$ \# } > \text{ " \& } \\ &@ > \text{œ} \text{ ! } \\ &\$ \# > \text{ " \& } \text{œ} \text{ ! } \\ &> \text{œ} \text{ \# } \text{ seconds} \end{aligned}$
99. $1 \text{ . } \text{œ} \text{ \$! ! .}$
 $1 \text{ \$ \& } \text{œ} \text{ \$! ! } \$ \# \text{ œ} \text{ " ! * , \& ! ! } \text{ gallons}$
100. $Z < \text{œ} \text{ \% } \# 1 < \text{ } ^{\$}$
 $Z \# * \text{ \& } \text{œ} \text{ \% } 1 \text{ } ^{\# * \& \# } \text{ } ^{\$}$, $\text{ " \$, \% \# } \text{ cm}^{\$}$
101. Let B œ the length. Then $B \&$ œ the width.
 $E B$ œ $B B \&$ œ $B \# \& B$
102. $Z B$ œ $B \$ B \%$ œ " \# B \#
103. a. $G B$ œ $) B$ ($\&$
 b. $G) \&$ œ $)) \&$ ($\&$ œ $\$ (\& \&$
104. $G B$ œ $\% \& B \text{ ' !}$
105. a. $G B$ œ $! \text{ ! } (B \text{ } * \text{ \& } * *$
 b. $G \# !$ œ $! \text{ ! } (\# ! \text{ } * \text{ \& } * * \text{ œ} \text{ \$ " " \& } \$ *$
106. a. $M B$ œ $\# \& B \text{ \% !}$
 b. $M \text{ " } (\&$ œ $\# \& \text{ " } (\&$ $\% !$ œ $\$ \$ * (\& !$
- 107-110. Answers may vary.
111. They are different. " ! is in the domain of $O B$, but not in the domain of $1 B$.
- 112-113. Answers may vary.
114. They are different. The domain of $O B$ is the set of all real numbers, but 3 is not in the domain of $1 B$.

115. $\frac{O B 2 O B}{2} \text{œ} \text{ \& \& } \text{œ} \frac{!}{2} \text{œ} \text{ ! . } \bar{2}$

116. e

117. d

118. b

119. e

120. f

121. c

122. e

123. a

Exercises 2.2 (page 216)

1. quadrants 2. origin 3. to the right 4. upward
5. first 6. second 7. linear 8. C-axis
9. B-intercept 10. vertical 11. horizontal
12. $E B B_{\#} C$ " $\frac{\# - C \#}{\#}$ 13. midpoint 14. $Q \check{S} \frac{B_{\#} - B_{\#}}{\#} , \frac{C_{\#} - C_{\#}}{\#} <$
15. E #, \$ 16. F \$, & 17. G #, \$ 18. H %, &

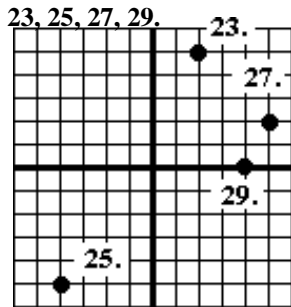
EXERCISES 2.2

19. ! !, !

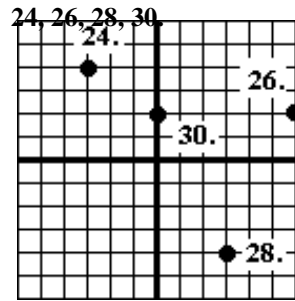
20. J %, !

21. K &, &

22. L #, #



23. QI



25. QIII

24. QII

27. QI

26. QI

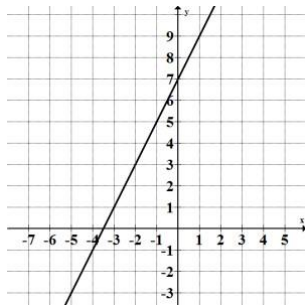
29. B-axis

28. QIV

30. C-axis

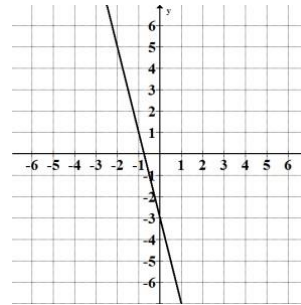
31. C #B œ (
 C œ #B (

B	C
!	(
#	\$



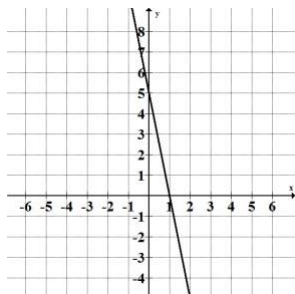
32. C \$ œ %B
 C œ %B \$

B	C
!	\$
"	"



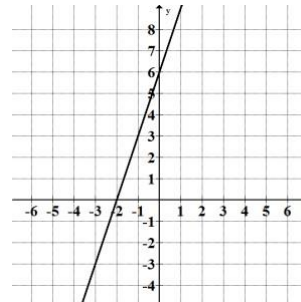
33. C &B œ &
 C œ &B &

B	C
!	&
"	!



34. C \$B œ "
 C œ \$B "

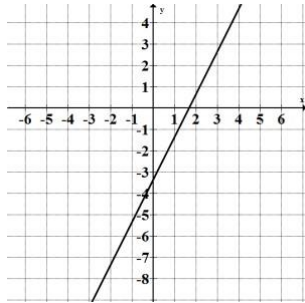
B	C
!	"
#	!



EXERCISES 2.2

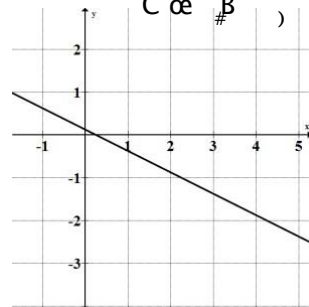
35. $B = C - 1$
 $C = B + \frac{1}{3}$

B	C
!	$-\frac{1}{3}$
#	$\frac{1}{3}$



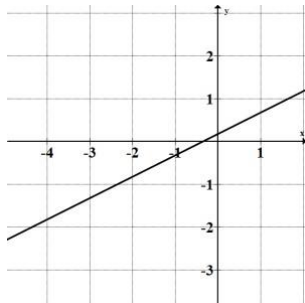
36. $B = C - 1$
 $C = B - \frac{1}{3}$

B	C
!)
%	$-\frac{1}{3}$



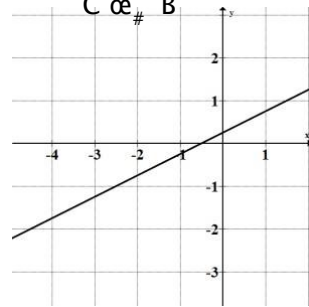
37. $B = C - 1$
 $C = B - \frac{1}{3}$

B	C
!)
#	$-\frac{1}{3}$



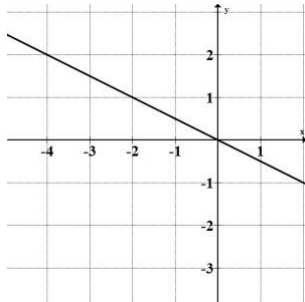
38. $B = C - 1$
 $C = B - \frac{1}{3}$

B	C
!)
#	$-\frac{1}{3}$



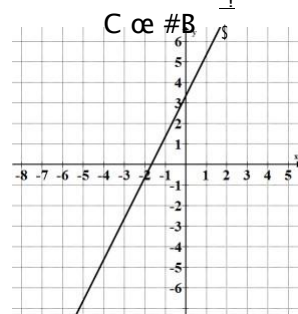
39. $B = C - 1$
 $C = B - \frac{1}{3}$

B	C
!	!
#)



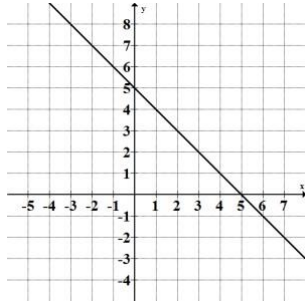
40. $B = C - 1$
 $C = B - \frac{1}{3}$

B	C
!	$-\frac{1}{3}$
#	$-\frac{1}{3}$



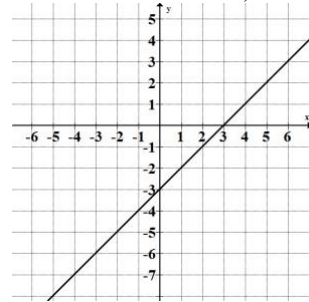
EXERCISES 2.2

41. $B C \text{ œ } \&$ $B C \text{ œ } \&$
 $B ! \text{ œ } \&$ $! C \text{ œ } \&$
 $B \text{ œ } \&$ $C \text{ œ } \&$
 $\&, !$ $!, \&$

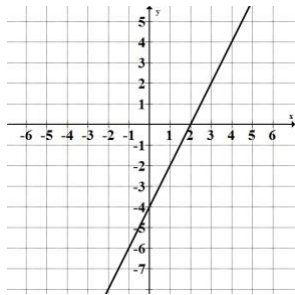


42. $B C \text{ œ } \$$ $B C \text{ œ } \$$
 $B ! \text{ œ } \$$ $! C \text{ œ } \$$
 $B \text{ œ } \$$ $C \text{ œ } \$$
 $\$, !$ $C \text{ œ } \$$

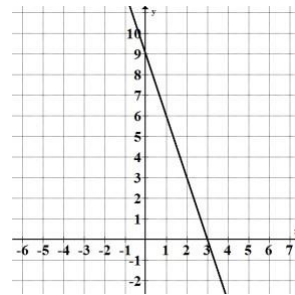
 $!, \$$



43. $\# B C \text{ œ } \%$ $\# B C \text{ œ } \%$
 $\# B ! \text{ œ } \%$ $\# ! C \text{ œ } \%$
 $\# B \text{ œ } \%$ $C \text{ œ } \%$
 $B \text{ œ } \#$ $C \text{ œ } \%$
 $\#, !$ $!, \%$

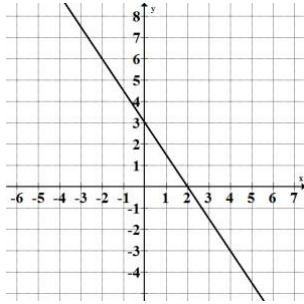


44. $\$ B C \text{ œ } *$ $\$ B C \text{ œ } *$
 $\$ B ! \text{ œ } *$ $\$! C \text{ œ } *$
 $\$ B \text{ œ } *$ $C \text{ œ } *$
 $B \text{ œ } \$$ $!, *$
 $\$, !$

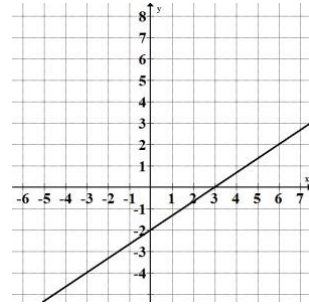


EXERCISES 2.2

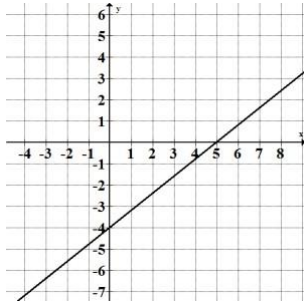
45. $\$B \#C \in \mathbb{R}$ $\$B \#C \in \mathbb{R}$
 $\$B \# ! \in \mathbb{R}$ $\$! \#C \in \mathbb{R}$
 $\$B \in \mathbb{R}$ $\#C \in \mathbb{R}$
 $B \in \mathbb{R} \#$ $C \in \mathbb{R} \$$
 $\#, !$ $!, \$$



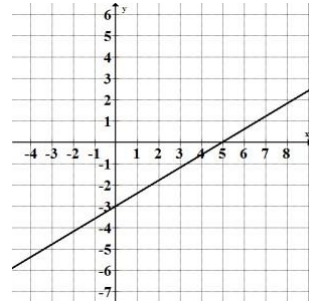
46. $\#B \$C \in \mathbb{R}$ $\#B \$C \in \mathbb{R}$
 $\#B \$! \in \mathbb{R}$ $\# ! \$C \in \mathbb{R}$
 $\#B \in \mathbb{R}$ $\$C \in \mathbb{R}$
 $B \in \mathbb{R} \$$ $C \in \mathbb{R} \#$
 $\$, !$ $!, \#$



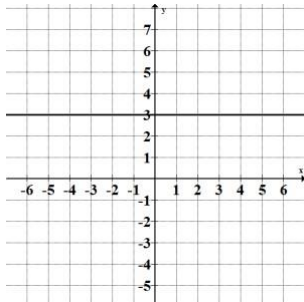
47. $\%B \&C \in \mathbb{R} !$ $\%B \&C \in \mathbb{R} !$
 $\%B \& ! \in \mathbb{R} !$ $\% ! \&C \in \mathbb{R} !$
 $\%B \in \mathbb{R} !$ $\&C \in \mathbb{R} !$
 $B \in \mathbb{R} \&$ $C \in \mathbb{R} \%$
 $\&, !$ $!, \%$



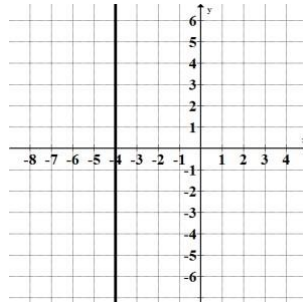
48. $\$B \&C \in \mathbb{R} \&$ $\$B \&C \in \mathbb{R} \&$
 $\$B \& ! \in \mathbb{R} \&$ $\$! \&C \in \mathbb{R} \&$
 $\$B \in \mathbb{R} \&$ $\&C \in \mathbb{R} \&$
 $B \in \mathbb{R} \&$ $C \in \mathbb{R} \$$
 $\&, !$ $!, \$$



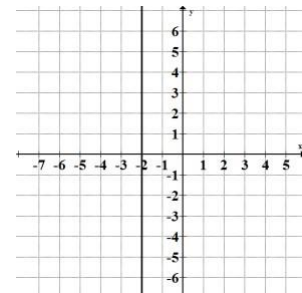
49. $C \in \mathbb{R} \$$



50. $B \in \mathbb{R} \%$

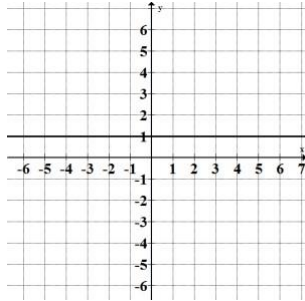


51. $\$B \& \in \mathbb{R} "$
 $\$B \in \mathbb{R} \hat{=} B \in \mathbb{R} \#$

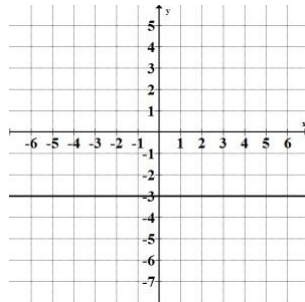


EXERCISES 2.2

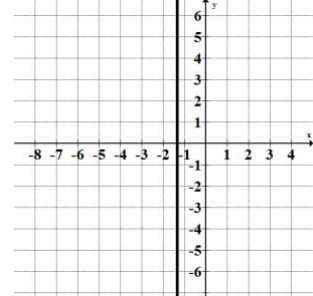
52. $C \cap \{a\}$
 $(C \cap \{a\}) \cap C$



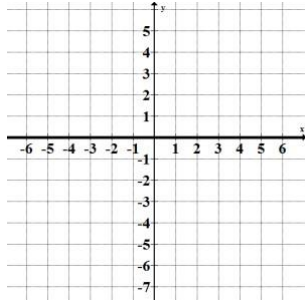
53. $\{C \cap \{a\}\}$
 $\{C \cap \{a\}\} \cap C$
 $\{C \cap \{a\}\} \cap C \cap \{a\}$



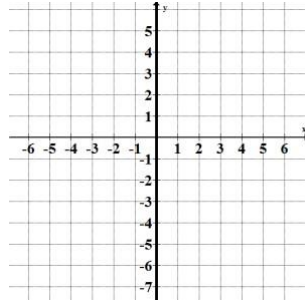
54. $\{C \cap \{a\}\} \cap B \cap C$
 $\{C \cap \{a\}\} \cap B \cap C$
 $\{C \cap \{a\}\} \cap B \cap C \cap \{a\}$



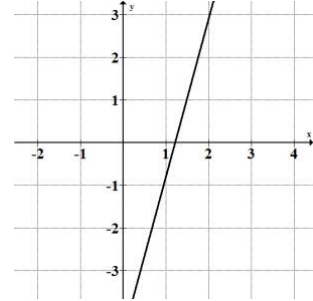
55. $\{C \cap \{a\}\} \cap B \cap C$
 $\{C \cap \{a\}\} \cap B \cap C$
 $\{C \cap \{a\}\} \cap B \cap C \cap \{a\}$



56. $\{C \cap \{a\}\} \cap B \cap C$
 $\{C \cap \{a\}\} \cap B \cap C$
 $\{C \cap \{a\}\} \cap B \cap C \cap \{a\}$

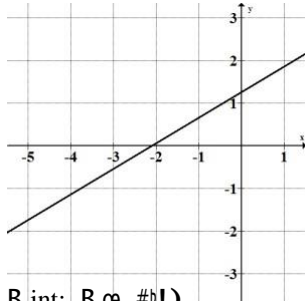


57. $C \cap \{a\} \cap B \cap C$



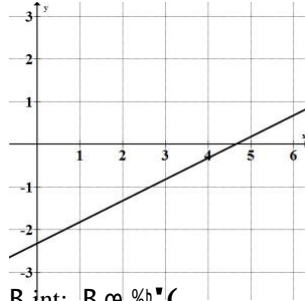
B-int: $B \cap \{a\}$

58. $C \cap \{a\} \cap B \cap C$
 $\{a\} \cap B$



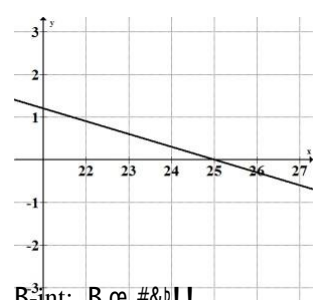
B-int: $B \cap \{a\}$

59. $\{a\} \cap B \cap C \cap \{a\}$
 $\{a\} \cap B \cap C$
 $\{a\} \cap B \cap C \cap \{a\}$



B-int: $B \cap \{a\}$

60. $\{a\} \cap B \cap C \cap \{a\}$
 $C \cap \{a\} \cap B \cap C$



B-int: $B \cap \{a\}$

EXERCISES 2.2

61. . œ É B# B" # C# C" #
 œ É % ! # \$! #
 œ É % # \$ #
 œ È " * œ È # & œ &
63. . œ É B# B" # C# C" #
 œ É \$! # # ! #
 œ É \$ # # #
 œ È * % œ È " \$
65. . œ É B# B" # C# C" #
 œ É " ! # " ! #
 œ É " # " #
 œ È " " œ È #
67. . œ É B# B" # C# C" #
 œ È Š È \$! < " ! #
 œ È Š È \$ < " #
 œ È \$ " œ È % œ #
69. . œ É B# B" # C# C" #
 œ É \$ ' # (\$ #
 œ É \$ # % #
 œ È * " œ È # & œ &
71. . œ É B# B" # C# C" #
 œ É c % " d# c ' ' d#
 œ É & # " # #
 œ È # & " % œ È " * œ " \$

62. . œ É B# B" # C# C" #
 œ É & ! # " # ! #
 œ É & # " # #
 œ È # & " % œ È " * œ " \$
64. . œ É B# B" # C# C" #
 œ É & ! # ! ! #
 œ É & # ! #
 œ È # & ! œ È # & œ &
66. . œ É B# B" # C# C" #
 œ É ' ! #) ! #
 œ É ' #) #
 œ È \$ ' % œ È " ! ! œ " !
68. . œ É B# B" # C# C" #
 œ È Š È (! < Š È # ! < #
 œ È Š È (< Š È # < #
 œ È (# œ È * œ \$
70. . œ É B# B" # C# C" #
 œ É % * # * # " #
 œ É & # " # #
 œ È # & " % œ È " * œ " \$
72. . œ É B# B" # C# C" #
 œ É c ! ' d# c & \$ d#
 œ É ' #) #
 œ È \$ ' % œ È " ! ! œ " !

EXERCISES 2.2

$$73. \begin{aligned} & . \alpha \acute{E} B_{\#} B'' \# C_{\#} C'' \# \\ & \alpha \acute{E} c \# \quad \cdot d^{\#} \quad c'' \& \quad \#'' d^{\#} \\ & \alpha \acute{E} \% \# \cdot \# \\ & \alpha \acute{E}'' \cdot \quad \$ \cdot \alpha \acute{E} \& \# \alpha \# \acute{E}'' \$ \end{aligned}$$

$$75. \begin{aligned} & . \alpha \acute{E} B_{\#} B'' \# C_{\#} C'' \# \\ & \alpha \acute{E} c \$ \quad \& d^{\#} \quad c \$ \quad \& d^{\#} \\ & \alpha \acute{E}) \#) \# \\ & \alpha \acute{E}'' \% \quad \cdot \% \alpha \acute{E}'' \#) \alpha) \acute{E} \# \end{aligned}$$

$$77. \begin{aligned} & . \alpha \acute{E} B_{\#} B'' \# C_{\#} C'' \# \\ & \alpha \acute{E} c 1 \quad 1 d^{\#} \quad c \# \quad \& d^{\#} \\ & \alpha \acute{E} ! \# (\# \\ & \alpha \acute{E} ! \quad \% * \alpha \acute{E} \% * \alpha (\end{aligned}$$

$$74. \begin{aligned} & . \alpha \acute{E} B_{\#} B'' \# C_{\#} C'' \# \\ & \alpha \acute{E} c (\quad \cdot'' d^{\#} \quad c'''' (d^{\#} \\ & \alpha \acute{E} \% \# \% \# \\ & \alpha \acute{E}'' \cdot \quad \cdot'' \alpha \acute{E} \$ \# \alpha \% \acute{E} \# \end{aligned}$$

$$76. \begin{aligned} & . \alpha \acute{E} B_{\#} B'' \# C_{\#} C'' \# \\ & \alpha \acute{E} c \cdot \quad \$ d^{\#} \quad c \$ \quad \# d^{\#} \\ & \alpha \acute{E} * \# \& \# \\ & \alpha \acute{E})'' \quad \# \& \alpha \acute{E}'' !' \end{aligned}$$

$$78. \begin{aligned} & . \alpha \acute{E} B_{\#} B'' \# C_{\#} C'' \# \\ & \alpha \acute{E} \cdot \acute{E} \& !'' \quad c ! \quad \# d^{\#} \\ & \alpha \acute{E} \cdot \cdot \& \# \\ & \alpha \acute{E} \& \quad \% \alpha \acute{E} * \alpha \$ \end{aligned}$$

$$79. Q \check{S} \frac{B''}{\#} \frac{B_{\#}}{\#}, \frac{C''}{\#} \frac{C_{\#}}{\#} < \alpha Q \check{E} \frac{\#}{\#}, \frac{\cdot}{\#} \square \alpha Q \check{E} \frac{\cdot}{\#}, \frac{\cdot}{\#} \square \alpha Q \%, \cdot$$

$$80. Q \check{S} \frac{B''}{\#} \frac{B_{\#}}{\#}, \frac{C''}{\#} \frac{C_{\#}}{\#} < \alpha Q \check{E} \frac{\$}{\#}, \frac{\cdot}{\#} \square \alpha Q \check{E} \frac{\cdot}{\#}, \frac{\cdot}{\#} \square \alpha Q \cdot, \cdot \quad \#$$

$$81. Q \check{S} \frac{B''}{\#} \frac{B_{\#}}{\#}, \frac{C''}{\#} \frac{C_{\#}}{\#} < \alpha Q \check{E} \frac{\#}{\#}, \frac{\&}{\#} \square \alpha Q \check{E} \frac{!}{\#}, \frac{\cdot}{\#} \square \alpha Q !, \cdot \quad \#$$

$$82. Q \check{S} \frac{B''}{\#} \frac{B_{\#}}{\#}, \frac{C''}{\#} \frac{C_{\#}}{\#} < \alpha Q \check{E} \frac{!}{\#}, \frac{\cdot}{\#} \square \alpha Q \check{E} \frac{!}{\#}, \frac{\cdot}{\#} \square \alpha Q \&, \&$$

$$83. Q \check{S} \frac{B''}{\#} \frac{B_{\#}}{\#}, \frac{C''}{\#} \frac{C_{\#}}{\#} < \alpha Q \check{E} \frac{\cdot}{\#}, \frac{\&}{\#} \square \alpha Q \check{E} \frac{\cdot}{\#}, \frac{\cdot}{\#} \square \alpha Q \check{E} \cdot, \cdot \quad \#$$

$$84. Q \check{S} \frac{B''}{\#} \frac{B_{\#}}{\#}, \frac{C''}{\#} \frac{C_{\#}}{\#} < \alpha Q \check{E} \frac{\$}{\#}, \frac{\cdot}{\#} \square \alpha Q \check{E} \frac{\&}{\#}, \frac{\&}{\#} \square \alpha Q \check{E} \frac{\&}{\#}, \frac{\&}{\#} \quad \#$$

$$85. Q \check{S} \frac{B''}{\#} \frac{B_{\#}}{\#}, \frac{C''}{\#} \frac{C_{\#}}{\#} < \alpha Q \quad \square \frac{!}{\#}, \frac{!}{\#} \square \alpha \quad \square \frac{\acute{E}}{\#}, \frac{\acute{E}}{\#} \quad \square$$

EXERCISES 2.2 # # # #
Q R œ É B# B" # C# C" # œ É % & # () # œ È" " œ È# - # #

EXERCISES 2.2

94. $Q \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$; $R \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$

$EF \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$; $Q R \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$

95. $Q \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$; $P \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$

Area of $ESF \propto \frac{1}{2} \times \text{base} \times \text{height} \propto \frac{1}{2} \times SE \times SF \propto \frac{1}{2} \times \frac{1}{\sqrt{B}} \times \frac{1}{\sqrt{C}} \propto \frac{1}{2\sqrt{BC}}$

Area of $SPQR \propto \text{length} \times \text{width} \propto SP \times SR \propto \frac{1}{\sqrt{B}} \times \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$ Area of ESF

96. Let B be the width from E to H . Then the length from E to F is $\sqrt{3}B$.
 Perimeter $\propto \sqrt{3}B$
 $B + \sqrt{3}B + \sqrt{3}B \propto \sqrt{3}B$
 $B \propto \sqrt{3}B$
 $B \propto \sqrt{3}B$

Thus, the distance from E to H is $\sqrt{3}B$ and the distance from E to F is $\sqrt{3}B$. Thus, the B -coordinate of G is $\frac{\sqrt{3}}{2}B$, or $\frac{\sqrt{3}}{2}B$. The C -coordinate of G is $\frac{\sqrt{3}}{2}B$ (or $\frac{\sqrt{3}}{2}B$). Point G then has coordinates $(\frac{\sqrt{3}}{2}B, \frac{\sqrt{3}}{2}B)$.

97. $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 The value will be \$412,500.

98. Set $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$

The car will be worthless after 12.5 years.

99. $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$; $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$; $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$; $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$; $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 200 scanners will be sold.

100. $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$; $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$; $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$; $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$; $C \propto \frac{1}{\sqrt{B}} \frac{1}{\sqrt{C}} \propto \frac{1}{\sqrt{BC}}$
 200 TVs will be produced.

101. $Z \propto \frac{8@}{R}$
 $'! \propto \frac{#@}{#!}$

"### \propto "#@
 "!! \propto @

The smaller gear is spinning at 100 rpm.

EXERCISES 2.2

102. $0\text{DB}\dot{N} \propto \%\$! \quad !\text{p}!!\&x$
 $\$&! \propto \%\$! \quad !\text{p}!!\&.$
 $!\text{p}!!\&. \propto)!$

. \propto "v,!!!
 \$16,000 would reduce the number to 350.

EXERCISES 2.2

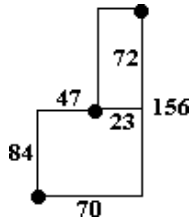
103.
$$\frac{B_1 - B_2}{C_1 - C_2} < \frac{B_3 - B_4}{C_3 - C_4} \iff \frac{B_1 - B_2}{C_1 - C_2} < \frac{B_3 - B_4}{C_3 - C_4}$$

104.
$$\frac{B_1 - B_2}{C_1 - C_2} < \frac{B_3 - B_4}{C_3 - C_4} \iff \frac{B_1 - B_2}{C_1 - C_2} < \frac{B_3 - B_4}{C_3 - C_4}$$

105.
$$\frac{B_1 - B_2}{C_1 - C_2} < \frac{B_3 - B_4}{C_3 - C_4} \iff \frac{B_1 - B_2}{C_1 - C_2} < \frac{B_3 - B_4}{C_3 - C_4}$$

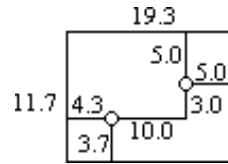
106.
$$\frac{B_1 - B_2}{C_1 - C_2} < \frac{B_3 - B_4}{C_3 - C_4} \iff \frac{B_1 - B_2}{C_1 - C_2} < \frac{B_3 - B_4}{C_3 - C_4}$$

107.



- . # œ (!# "&"#
- . # œ %*!! #%, \$\$"
- . # œ #*, # \$"
- . œ È #*, # \$"
- . , "(" miles

108.



- . # œ 10# 3#
- . # œ 1!! 9
- . # œ 10*—
- . œ È 109
- . , "!"% mm

109-112. Answers may vary.

113. True.

114. True.

115. False. Vertical lines have equations that are not functions.

116. False. Only two points are required to graph a line.

117. False. The vertical line $B = 1$ has infinitely many C -intercepts.

118. False. Most horizontal lines have no B -intercept.

119. True.

120. True.

Exercises 2.3 (page 229)

- 1. divided
- 2. C
- 3. run
- 4. same order
- 5. the change in
- 6. horizontal
- 7. vertical
- 8. parallel
- 9. perpendicular
- 10. "
- 11. $7 \iff \frac{C_1 - C_2}{B_1 - B_2} \iff \frac{\#}{\#} \iff \frac{\$}{\$} \iff "$
- 12. $7 \iff \frac{C_1 - C_2}{B_1 - B_2} \iff \frac{\$}{\& \$} \iff \frac{\%}{\#} \iff \#$
- 13. $7 \iff \frac{C_1 - C_2}{\# \$} \iff \frac{\&}{\&} \iff \frac{\&}{\&}$
- 14. $7 \iff \frac{C_1 - C_2}{\# \&} \iff \frac{\&}{\&} \iff \&$

EXERCISES 2.3

15. $7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{\& \#} \text{ } \text{œ} \underline{(} \text{ } \underline{(}$
 $B\# B'' \text{ } " \$ \% \%$

16. $7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{'''} \underline{(} \text{ } \text{œ} \underline{*} \text{ } \text{œ} \$$
 $B\# B'' \text{ } ' \$ \$$

17. $7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{''} \underline{(} \text{ } \text{œ} \underline{)} \text{ } \text{œ} \#$
 $B\# B'' \text{ } \%) \%$

18. $7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{''} \underline{''} \underline{(} \text{ } \text{œ} \underline{!} \text{ } \text{œ} !$
 $B\# B'' \text{ } '' (\& '' \#$

19. $7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{''\% ''\%} \text{ } \text{œ} \underline{!} \text{ } \text{œ} !$
 $B\# B'' \text{ } \# (*$

20. $7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{\$ \$} \text{ } \text{œ} \underline{'} \text{ } \hat{E} \text{ und.}$
 $B\# B'' \text{ } \% \% !$

21. $7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{\# \$} \text{ } \text{œ} \underline{\&} \text{ } \hat{E} \text{ und.}$
 $B\# B'' \text{ } \& \& !$

22. $7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{\# \hat{E} (-} \text{ } \text{œ} "$
 $B\# B'' \text{ } \hat{E} (- \#$

23. $7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{(\#} \text{ } \underline{\& \&} \text{ } \text{œ} \underline{\& \&}$
 $B\# B'' \text{ } \& \# \underline{\$} \text{ } \text{œ} \underline{\$} \text{ } \underline{\$} \text{ } \underline{\$}$
 $B\# B'' \text{ } \underline{\& \#} \text{ } \underline{\$ \#} \text{ } \underline{\#} \text{ } \underline{\$}$

24. $\underline{C\# C''} \text{ } \underline{\underline{\&}} \text{ } \underline{\underline{''}} \text{ } \underline{\underline{''}} \text{ } \underline{\underline{''}} \text{ } \text{œ} \#$
 $\underline{\&} \underline{\&} \underline{\&}$
 $7 \text{ } \text{œ} \text{ } \text{œ} \underline{\$} \text{ } \underline{\$} \text{ } \text{œ} \underline{\$}$
 $B\# B'' \text{ } \underline{\$} \text{ } \underline{\underline{\wedge}} \text{ } \underline{\#} \text{ } \underline{\%}$

25. $7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{+ -}$
 $B\# B'' \text{ } \text{œ} \underline{, - + ,}$
 $\underline{+ -} \text{ } \text{œ} "$
 $\underline{- +}$

26. $7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{+ !}$
 $B\# B'' \text{ } + , , +$

27. $C \text{ } \text{œ} \$ B \# 7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{\& \#}$
 $B\# B'' \text{ } " !$
 $\text{œ} \underline{\underline{''}} \text{ } \text{œ} \$$

B	C
!	#
"	&

28. $C \text{ } \text{œ} \& B) 7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{\$)}$
 $B\# B'' \text{ } \& " !$
 $\text{œ} \underline{\underline{''}} \text{ } \text{œ} \&$

B	C
!)
"	\$

29. $C \text{ } \text{œ} \% B ' 7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{\# '}$
 $B\# B'' \text{ } " !$
 $\text{œ} \underline{\underline{''}} \text{ } \text{œ} \%$

B	C
!	'
"	#

30. $C \text{ } \text{œ} B \& 7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{\% \&}$
 $B\# B'' \text{ } \$$
 $\text{œ} \underline{\underline{''}} \text{ } \text{œ} \underline{\underline{''}}$

B	C
!	&
\$	%

31. $\& B " ! C \text{ } \text{œ} \$ 7 \text{ } \underline{C\# C''} \text{ } \text{œ} \underline{-}$

201 $B\# B'' \text{ } \underline{\underline{\wedge}} \text{ } \underline{\underline{\$}} \text{ } \underline{\underline{\%}}$

B	C
!)
"	\$

EXERCISES 2.3

32.)C C# C"
 #B œ & B# B"
 7 œ \$ &

B	C, !
!	— \$
"	" &

œ & — " !

œ # ! œ " —

" #
 7 œ C# C"

33. \$ C # œ #B \$
 \$C #B œ *

B	C
!	\$
\$	"

B# B"
 œ — \$

œ # \$!

34. % B # œ \$C #
 %B \$C œ " !

B	C
!	— " !
"	#

- -

œ) —)
 " !

œ — # œ " —

" %

7 œ C# C"

B# B"
 œ # ^ " ! %

œ % œ % !

" \$

EXERCISES 2.3

35. $\$ C B \text{ œ } \$ B "$
 $\$ C \text{ œ } \$$

$7 \text{ œ } \frac{C\# - C"}{B\# - B"}$

36. $\#B \& \text{ œ } \# C B$
 $\& \text{ œ } \# C$
 $7 \text{ œ } \frac{C\# - C"}{B\# - B"}$

C œ "

B	C
!	"
"	"

$\text{œ } \frac{!}{"}$
 $\text{œ } \frac{!}{"}$

$\frac{!}{"}$ œ C

B	C
!	"
"	"

$\frac{!}{"}$
 $\text{œ } \frac{!}{"}$
 $\text{œ } \frac{!}{"}$

37. horizontal Ê 7 œ !

38. #C œ &
 C œ &
 horizontal Ê 7 œ !

39. 0 B œ $\frac{!}{"}$ Ê C œ $\frac{!}{"}$
 horizontal Ê 7 œ !

40. 0 B œ 1 Ê C œ 1
 horizontal Ê 7 œ !

41. B œ $\frac{!}{"}$
 vertical Ê 7 is undefined.

42. B (œ !
 B œ (
 vertical Ê 7 is undefined.

43. The slope is negative.

44. The slope is zero.

45. The slope is positive.

46. The slope is positive.
 49. $7 \cdot 7 \text{ œ } \$ \frac{!}{"}$
 perpendicular

47. The slope is undefined.
 50. $7 \cdot A 7 \#;$ $7 \cdot 7 \text{ œ } \# \frac{!}{"}$
 neither

51. $7 \cdot \text{œ } E) \text{ œ } \# E \# \text{ œ } 7 \#$
 parallel

52. $7 \cdot 7 \# \text{ œ } " " \text{ œ } "$
 perpendicular

53. $7 \cdot 7 \text{ œ } \frac{!}{"}$
 perpendicular

54. $7 \text{ œ } \frac{!}{"}$
 parallel

55. $7 \cdot 7 \text{ œ } ! \# \&) \text{ œ } "$
 perpendicular

56. $7 \cdot \text{œ } ! \# \& \text{ œ } \frac{!}{"}$
 parallel

57. $7 \cdot 7 \text{ œ } +, \wedge +, \% \text{ œ } +!, ! \text{ œ } "$
 perpendicular

58. $7 \cdot \text{œ } \frac{!}{"}$
 $7 \cdot 7 \# \text{ œ } \frac{!}{"}$ neither

EXERCISES 2.3

For Exercises 59-64 use the slope of line through R and S calculated below:

$$7_{vw} \text{ œ } \frac{C_{\#} - C''}{B_{\#} - B''} \text{ œ } \frac{(\&)}{\# \ \$} \text{ œ } \frac{\#}{\&}$$

59. $7_{TU} \text{ œ } \frac{C_{\#} - C''}{B_{\#} - B''} \text{ œ } \frac{\%}{\#} \text{ œ } \frac{\#}{\&} \text{ œ } 7_{vw} \hat{=} \text{ parallel}$

60. $7_{TU} \text{ œ } \frac{C_{\#} - C''}{B_{\#} - B''} \text{ œ } \frac{\%}{\# \ \$} \text{ œ } \frac{\%}{\#} \text{ œ } \frac{\#}{\&} \text{ œ } 7_{vw} \hat{=} \text{ parallel}$

61. $7_{TU} \text{ œ } \frac{C_{\#} - C''}{B_{\#} - B''} \text{ œ } \frac{\%}{\#} \text{ œ } \frac{\&}{\#} \text{ œ } \frac{\&}{\#} \hat{=} \text{ perpendicular}$

62. $7_{TU} \text{ œ } \frac{C_{\#} - C''}{B_{\#} - B''} \text{ œ } \frac{\%}{\#} \text{ œ } \frac{\%}{\#} \text{ œ } \frac{\&}{\#} \hat{=} \text{ neither}$

63. $7_{TU} \text{ œ } \frac{C_{\#} - C''}{B_{\#} - B''} \text{ œ } \frac{\%}{\#} \text{ œ } \frac{\&}{\#} \text{ œ } \frac{\&}{\#} \hat{=} \text{ neither}$

64. $7_{TU} \text{ œ } \frac{C_{\#} - C''}{B_{\#} - B''} \text{ œ } \frac{\%}{\#} \text{ œ } \frac{\&}{\#} \text{ œ } \frac{\&}{\#} \hat{=} \text{ perpendicular}$

65. $7_{vw} \text{ œ } \frac{C_{\#} - C''}{B_{\#} - B''} \text{ œ } \frac{\%}{\#} \text{ œ } \frac{\#}{\&}; 7_{vw} \text{ œ } \frac{C_{\#} - C''}{B_{\#} - B''} \text{ œ } \frac{\%}{\#} \text{ œ } \frac{\#}{\&}$
 $\frac{\%}{\#} \text{ œ } \frac{\#}{\&}; B'' \text{ œ } \& \hat{=} B \text{ œ } \&$

66. $7_{TU} \text{ œ } \frac{C_{\#} - C''}{B_{\#} - B''} \text{ œ } \frac{\%}{\#} \text{ œ } \frac{\&}{\#} \text{ œ } \frac{\&}{\#}; 7_{vw} \text{ œ } \frac{C_{\#} - C''}{B_{\#} - B''} \text{ œ } \frac{\%}{\#} \text{ œ } \frac{\#}{\&}$
 $\frac{\%}{\#} \text{ œ } \frac{\#}{\&} \hat{=} \boxed{C \text{ œ } *}$

67. $7_{TU} \text{ œ } \frac{C_{\#} - C''}{B_{\#} - B''} \text{ œ } \frac{\%}{\#} \text{ œ } \frac{\&}{\#} \text{ œ } \frac{\&}{\#}; 7_{vw} \text{ œ } \frac{C_{\#} - C''}{B_{\#} - B''} \text{ œ } \frac{\%}{\#} \text{ œ } \frac{\&}{\#}$
 $\frac{\%}{\#} \text{ œ } \frac{\#}{\&} \text{ Perp. slope œ } \frac{\#}{\&}; C \& \text{ œ } \# \hat{=} \boxed{C \text{ œ } *}$

EXERCISES 2.3

68. $\frac{C_1 - C_2}{B_1 - B_2} = \frac{\%}{\%}$; $\frac{C_1 - C_2}{B_1 - B_2} = \frac{\&}{\&}$

Perp. slope $= -\frac{B_1 - B_2}{C_1 - C_2}$; $B = \$ \hat{E} \boxed{B \text{ or } \$}$

69. $\frac{C_1 - C_2}{B_1 - B_2} = \frac{\&}{\&}$ $\frac{C_1 - C_2}{B_1 - B_2} = \frac{\$}{\$}$ \hat{E} not on same line

$B_1 - B_2 \quad \# \quad \# \quad \% \quad \%$

EXERCISES 2.3

70. $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{\# \text{ "}}{\text{ "}} \quad \text{œ} \frac{\text{ "}}{\text{ "}} \quad \text{œ} \frac{\text{ "}}{\text{ "}}$
 $\text{TU} \quad B\# \quad B''$
 $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{\$ \text{ "}}{\text{ "}} \quad \text{œ} \frac{\text{ "}}{\text{ "}} \quad \text{œ} \frac{\text{ "}}{\text{ "}} \quad \hat{E} \text{ not on same line}$

$\text{TV} \quad B\# \quad B'' \quad \$ \text{ "} \quad \% \quad \%$
 71. $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{! +}{+} \quad \text{œ} \frac{+}{+} \quad \text{œ} \frac{\text{ "}}{\text{ "}}$
 $\text{TU} \quad B\# \quad B'' \quad ! + \quad +$
 $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{+ +}{+ +} \quad \text{œ} \frac{\# +}{\# +} \quad \text{œ} \frac{\text{ "}}{\text{ "}} \quad \hat{E} \text{ on same line}$
 $\text{TV} \quad B\# \quad B'' \quad + + \quad \# +$

72. $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{+ + ,}{+ + ,} \quad \text{œ} \frac{+}{+} \quad \text{œ} \frac{+}{+}$
 $\text{TU} \quad B\# \quad B'' \quad + , + ,$
 $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{+ + ,}{+ + ,} \quad \text{œ} \frac{+}{+} \quad \text{œ} \frac{\text{ "}}{\text{ "}} \quad \hat{E} \text{ not on same line}$

$\text{TV} \quad B\# \quad B'' \quad + , + ,$
 73. $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{\& \%}{\& \%} \quad \text{œ} \frac{*}{*} \quad \text{œ} \frac{\$}{\$}$
 $\text{TU} \quad B\# \quad B'' \quad \# \& \quad \$$
 $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{\$ \%}{\$ \%} \quad \text{œ} \frac{(}{(} \quad \text{œ} \frac{(}{(}$
 $\text{TV} \quad B\# \quad B'' \quad) \& \quad \$ \# \quad \$$
 $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{\$ \&}{\$ \&} \quad \text{œ} \frac{\#}{\#} \quad \text{œ} \frac{-}{-} \quad \hat{E} \text{ None are perpendicular.}$

$\text{UV} \quad B\# \quad B'' \quad) \# \quad ' \quad \$$
 74. $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{\text{ ' } \#}{\text{ ' } \#} \quad \text{œ} \frac{)}{)} \quad \text{œ} \frac{\#}{\#}$
 $\text{TU} \quad B\# \quad B'' \quad (\# \quad \% \quad)$
 $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{(\#}{(\#} \quad \text{œ} \frac{\%}{\%} \quad \text{œ} \frac{*}{*} \quad \text{œ} \frac{-}{-}$
 $\text{TV} \quad B\# \quad B'' \quad (\text{ ' }) \quad \# \quad \#$
 $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{(\text{ ' })}{(\text{ ' })} \quad \text{œ} \frac{\text{ "}}{\text{ "}} \quad \hat{E} \text{ TU and UV are perpendicular.}$

$\text{UV} \quad B\# \quad B'' \quad \text{ ' } \% \quad \#$
 75. $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{* \$}{* \$} \quad \text{œ} \frac{\text{ ' }}{\text{ ' }} \quad \hat{E} \text{ undefined } \hat{E} \text{ vertical}$
 $\text{TU} \quad B\# \quad B'' \quad \text{ " } \text{ " } \quad !$
 $7 \quad \text{œ} \frac{C\# C''}{C\# C''} \quad \text{œ} \frac{\$ \$}{\$ \$} \quad \text{œ} \frac{!}{!} \quad \text{œ} \frac{\text{ "}}{\text{ "}} \quad \hat{E} \text{ horizontal}$

$\text{TV} \quad B\# \quad B'' \quad (\text{ " } \text{ ' }$

EXERCISES 2.3

7. $\vec{C} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$, $\vec{C}' = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$, $\vec{C} \cdot \vec{C}' = 14$. \vec{C} and \vec{C}' are perpendicular.

UV $\vec{B} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$, $\vec{B}' = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$

76. 7. $\vec{C} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$, $\vec{C}' = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$, $\vec{C} \cdot \vec{C}' = 14$.

TU $\vec{B} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$, $\vec{B}' = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$

7. $\vec{C} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$, $\vec{C}' = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$, $\vec{C} \cdot \vec{C}' = 14$.

TV $\vec{B} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$, $\vec{B}' = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$

7. $\vec{C} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$, $\vec{C}' = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$, $\vec{C} \cdot \vec{C}' = 14$. \vec{C} and \vec{C}' are perpendicular.

EXERCISES 2.3

77. $7 \quad \alpha \frac{C\#C''}{C\#C''} \alpha \frac{+!}{+!} \alpha \pm$

$7 \quad \alpha \frac{B\#B''}{C\#C''} \alpha \frac{+!}{+!} \alpha \pm \alpha \pm$

$7 \quad \alpha \frac{B\#B''}{C\#C''} \alpha \frac{+,+}{+,+} \alpha \frac{+,+}{+,+} \hat{E} \quad T U \text{ and } T V \text{ are perpendicular.}$

78. $7 \quad \alpha \frac{C\#C''}{C\#C''} \alpha \frac{+,+}{+,+} \alpha \frac{+,+}{+,+} \alpha \pm$

$7 \quad \alpha \frac{B\#B''}{C\#C''} \alpha \frac{+,+}{+,+} \alpha \pm \alpha \pm$

$7 \quad \alpha \frac{B\#B''}{C\#C''} \alpha \frac{+,+}{+,+} \alpha \pm \hat{E} \quad T V \text{ and } U V \text{ are perpendicular.}$

79. $7 \quad \alpha \frac{C\#C''}{C\#C''} \alpha \frac{\% \text{ "}}{\% \text{ "}} \alpha \& \alpha \&$

$7 \quad \alpha \frac{B\#B''}{C\#C''} \alpha \frac{\$ \text{ "}}{\$ \text{ "}} \alpha \# \hat{E} \quad E F \text{ and } E G \text{ are perpendicular. } \hat{E} \text{ right triangle}$

$E G \quad B\#B'' \quad \% \text{ "} \quad \&$

80. $7 \quad \alpha \frac{C\#C''}{C\#C''} \alpha \frac{\$ \text{ "}}{\$ \text{ "}} \alpha \# \alpha \#$

$7 \quad \alpha \frac{B\#B''}{C\#C''} \alpha \frac{\& \$ \text{ "}}{\$ \text{ "}} \alpha \# \hat{E} \quad H I \text{ and } I J \text{ are perpendicular. } \hat{E} \text{ right triangle}$

81. $7 \quad \alpha \frac{C\#C''}{C\#C''} \alpha \frac{! \text{ "}}{! \text{ "}} \alpha \text{ " } \alpha \text{ " } \alpha \hat{E} \quad \text{ " } \text{ " } \text{ " } \text{ " } \text{ " } \text{ " } \alpha \hat{E} \&$

$7 \quad \alpha \frac{B\#B''}{C\#C''} \alpha \frac{\$ \text{ "}}{\# \text{ "}} \alpha \# \alpha \text{ " } \alpha \text{ " } \alpha \hat{E} \quad \text{ " } \text{ " } \text{ " } \text{ " } \text{ " } \alpha \hat{E} \&$

$7 \quad \alpha \frac{B\#B''}{C\#C''} \alpha \frac{\# \$ \text{ "}}{\# \text{ "}} \alpha \text{ " } \alpha \text{ " } \alpha \hat{E} \quad \text{ " } \text{ " } \text{ " } \text{ " } \text{ " } \alpha \hat{E} \&$

$7 \quad \alpha \frac{B\#B''}{C\#C''} \alpha \frac{! \text{ "}}{\# \text{ "}} \alpha \# \alpha \text{ " } \alpha \text{ " } \alpha \hat{E} \quad \text{ " } \text{ " } \text{ " } \text{ " } \text{ " } \alpha \hat{E} \&$

HE $B\#B'' \quad ! \text{ "} \quad \text{ "}$
 Adjacent sides are perpendicular and congruent, so the figure is a square.

82. $7 \quad \alpha \frac{C\#C''}{C\#C''} \alpha \frac{! \text{ "}}{! \text{ "}} \alpha \text{ " } \alpha \text{ " } \alpha \hat{E} \quad \text{ " } \text{ " } \text{ " } \text{ " } \text{ " } \alpha \hat{E} \&$

$7 \quad \alpha \frac{B\#B''}{C\#C''} \alpha \frac{\$ \text{ "}}{\% \text{ "}} \alpha \% \alpha \text{ " } \alpha \text{ " } \alpha \hat{E} \quad \text{ " } \text{ " } \text{ " } \text{ " } \text{ " } \alpha \hat{E} \&$

EXERCISES 2.3

$\begin{matrix} JK \\ 7 \\ KL \\ 7 \\ LI \end{matrix} \begin{matrix} B\# \\ \cong \\ B\# \\ \cong \\ B\# \\ \cong \\ B\# \\ \cong \end{matrix} \begin{matrix} B'' \\ C'' \\ B'' \\ C'' \\ B'' \\ C'' \\ B'' \end{matrix} \begin{matrix} \# \\ \cong \\ \# \\ \cong \\ \# \\ \cong \\ \# \\ \cong \end{matrix} \begin{matrix} \$ \\ \% \\ \# \\ \% \\ \$ \\ \% \\ \# \\ \% \end{matrix} \begin{matrix} '' \\ \cong \\ '' \\ \cong \\ '' \\ \cong \\ '' \\ \cong \end{matrix} \begin{matrix} \text{à} \\ \text{d} \\ \text{L}, \\ \text{I} \\ \text{L}, \\ \text{I} \end{matrix} \begin{matrix} \text{E} \\ \text{E} \\ \text{E} \\ \text{E} \\ \text{E} \\ \text{E} \\ \text{E} \\ \text{E} \end{matrix} \begin{matrix} \# \\ \# \\ \# \\ \# \\ \# \\ \# \\ \# \\ \# \end{matrix} \begin{matrix} \% \\ \% \\ \% \\ \% \\ \% \\ \% \\ \% \\ \% \end{matrix} \begin{matrix} \$ \\ \$ \\ \$ \\ \$ \\ \$ \\ \$ \\ \$ \\ \$ \end{matrix} \begin{matrix} \cong \\ \cong \\ \cong \\ \cong \\ \cong \\ \cong \\ \cong \\ \cong \end{matrix} \begin{matrix} \text{E}'' \\ \text{E}'' \\ \text{E}'' \\ \text{E}'' \\ \text{E}'' \\ \text{E}'' \\ \text{E}'' \\ \text{E}'' \end{matrix} \begin{matrix} \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{matrix}$

Adjacent sides are perpendicular and congruent, so the figure is a square.

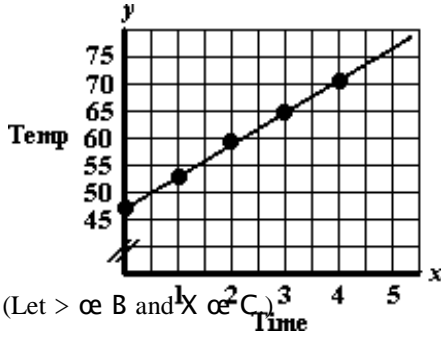
EXERCISES 23

The cost decreased about \$642.86 per year.

The cost absorbed by the hospital increased by \$25.80 per year.

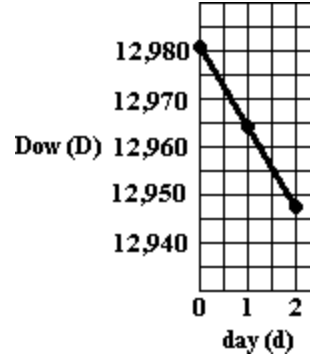
EXERCISES 2.3

91. $\frac{\Delta X}{\Delta t}$ is the hourly rate of change of temperature.

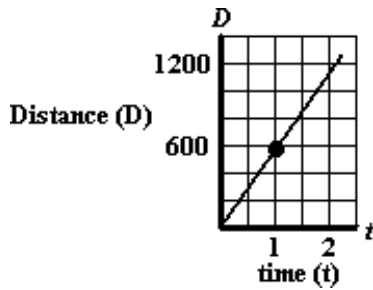


(Let x be hours and y be $^{\circ}\text{C}$.)

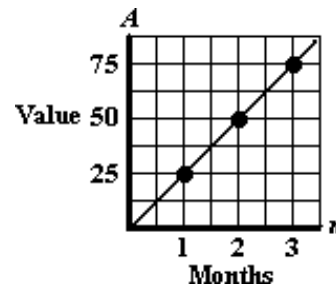
92. $\frac{\Delta H}{\Delta t}$ is the daily rate of change of the Dow Jones average.



93. $\frac{\Delta D}{\Delta t}$; The slope is the speed of the plane.



94. $\frac{\Delta A}{\Delta n}$; The slope is the monthly increase of the value of the account.



95-98. Answers may vary.

99. False. $\frac{\Delta C}{\Delta B} \neq \frac{C}{B}$.

100. True.

101. True. ($\Delta C \neq 0$.)

102. True. ($\Delta B \neq 0$.)

103. False. The line will be horizontal, so the slope is 0.

104. False. The line will be vertical, so the slope is undefined.

105. $\frac{\Delta C}{\Delta B} \neq \frac{C}{B} \neq \frac{\Delta C}{\Delta B} \neq \frac{C}{B}$. True.

106. $\frac{\Delta C}{\Delta B} \neq \frac{C}{B} \neq \frac{\Delta C}{\Delta B} \neq \frac{C}{B}$. True.

EXERCISES 2.4

Exercises 2.4 (page 243)

1. slope-intercept
2. 7
3. C-intercept
4. $C = C_0 + 7B$
5. $EB = FC + G$
6. regression
7. $C = 7B$,
 $C = \$B$ #
8. $C = 7B$,
 $C = \frac{B}{\#}$
\$ \$
9. $C = 7B$,
 $C = \&B$ -
&
10. $C = 7B$,
 $C = \frac{B}{\#}$ $\frac{B}{\#}$ -
11. $C = 7B$,
 $C = +B$ -
+
12. $C = 7B$,
 $C = +B$ #+
13. $C = 7B$,
 $C = +B$ +
14. $C = 7B$,
 $C = -B$ +
+
15. $C = 7B$,
! $\frac{B}{\#}$! ,
! $\frac{B}{\#}$! ,
! $\frac{B}{\#}$! ,
16. $C = 7B$,
($\frac{B}{\#}$ \$,
($\frac{B}{\#}$ \$,
* $\frac{B}{\#}$,
17. $C = 7B$,
& $\frac{B}{\#}$ \$ \$,
& $\frac{B}{\#}$ * ,
% $\frac{B}{\#}$,
18. $C = 7B$,
" $\frac{B}{\#}$ " & ,
" $\frac{B}{\#}$ & ,
' $\frac{B}{\#}$,
19. $\frac{C = 7B}{E\# \frac{B}{\#} E\# !}$,
 $\frac{C = 7B}{E\# \frac{B}{\#} E\#}$,
 $\frac{C = 7B}{E\# \frac{B}{\#} E\#}$,
 $\frac{C = 7B}{E\# \frac{B}{\#} E\#}$,
20. $C = 7B$,
! $\frac{B}{\#}$ $\frac{B}{\#}$ $\frac{B}{\#}$ $\frac{B}{\#}$ < ,
! $\frac{B}{\#}$ ' ,
' $\frac{B}{\#}$,
21. $\$B \#C \frac{B}{\#}$)
$\frac{B}{\#}$ $\frac{B}{\#}$)
 $\frac{B}{\#}$ $\frac{B}{\#}$ %
22. # $\frac{B}{\#}$ % $\frac{B}{\#}$ $\frac{B}{\#}$ "
% $\frac{B}{\#}$ $\frac{B}{\#}$ "
 $\frac{B}{\#}$ $\frac{B}{\#}$ \$
23. # $\frac{B}{\#}$ \$ $\frac{B}{\#}$ $\frac{B}{\#}$ &
$\frac{B}{\#}$ " $\frac{B}{\#}$ &
" $\frac{B}{\#}$ $\frac{B}{\#}$ &

\$ #
7 œ #, !, %

EXERCISES 2.4

7 œ #, !, \$

C œ B\$ &
" &
7 œ - \$, œ!, ¯ □

EXERCISES 2.4

24. $y = 2x + 3$

"!B " & C œ %

" & C œ "!B %
C œ B %

% " &
7 œ \$, œ!, " &

25. $y = \frac{1}{2}x - 1$

(B œ # C %

C œ (B %
(

C œ B #
(
7 œ #, !, #

26. $y = \frac{2}{3}x - 4$

" & B #! œ # C \$

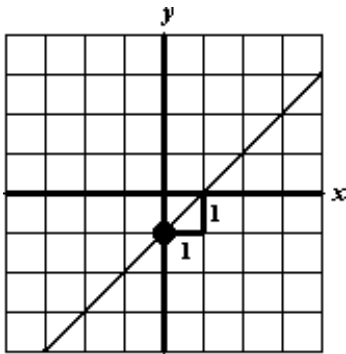
" & B #! œ # C %
C œ " & B "%

C œ " & B (

7 œ " & #, !, (

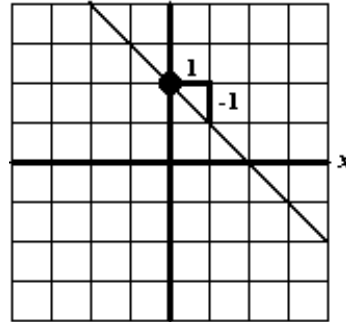
27. $y = x$

C œ B " Ê 7 œ ", !, "



28. $y = -x$

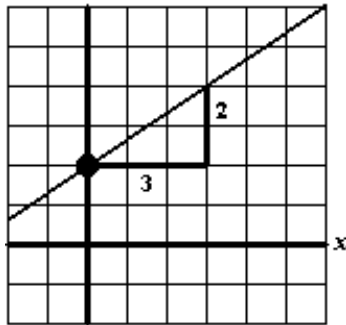
C œ B # Ê 7 œ ", !, #



29. $y = \frac{2}{3}x + 1$

B œ \$ C %
\$ C œ # B %
#

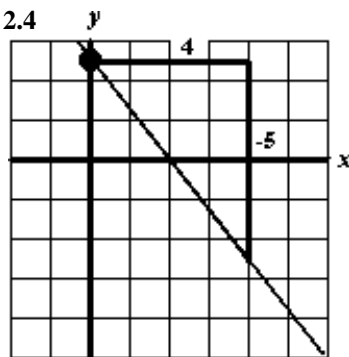
C œ B # Ê 7 œ ", !, #
\$ \$



30. $y = \frac{1}{2}x - 3$

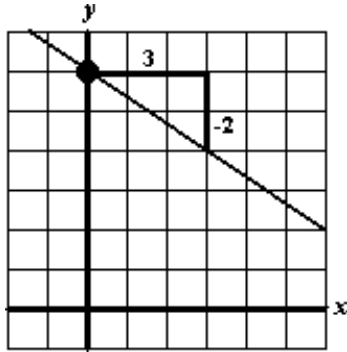
&
& B œ % C "%
% C œ & B "%
& & & &
C œ % B # Ê 7 œ ", !, #

EXERCISES 2.4

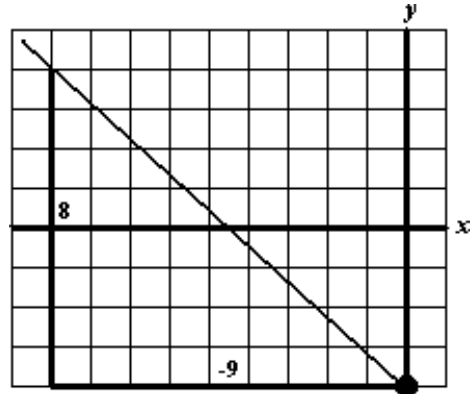


EXERCISES 2.4

31. $C \parallel B$
 $C \perp B$
 $C \perp B$
 $C \perp B$



32. $B \perp C$
 $B \perp C$
 $B \perp C$
 $B \perp C$



33. $C \perp B$
 $C \perp B$
 $C \perp B$
 $C \perp B$

The lines are parallel.

34. $C \perp B$
 $C \perp B$
 $C \perp B$
 $C \perp B$

The lines are neither.

35. $B \perp C$
 $B \perp C$
 $B \perp C$
 $B \perp C$

The lines are perpendicular.

36. $B \perp C$
 $B \perp C$
 $B \perp C$
 $B \perp C$

The lines are parallel.

37. $C \perp B$
 $C \perp B$
 $C \perp B$
 $C \perp B$

The lines are parallel.

38. $B \perp C$
 $B \perp C$
 $B \perp C$
 $B \perp C$

The lines are perpendicular.

EXERCISES 2.4

39. $\$B \quad "C \text{ œ } "$ $C \text{ œ } \overline{B}$

$"C \text{ œ } \$B \quad "$ $7 \text{ œ } \frac{\#}{\#}$

$C \text{ œ } \frac{\#}{\#} \quad "$ $7 \text{ œ } \frac{\#}{\#}$

$7 \text{ œ } \frac{\#}{\#}$

The lines are neither.

40. $B \text{ œ } \$C \quad \% \quad C \text{ œ } \$B \quad ($

$\$C \text{ œ } B \quad \% \quad 7 \text{ œ } \$$

$C \text{ œ } \frac{\#}{\$} B \quad \frac{\%}{\$}$

$7 \text{ œ } \frac{\#}{\$}$

The lines are perpendicular.

41. $C \text{ œ } \$ \quad B \text{ œ } \%$
 horizontal vertical
 The lines are perpendicular.

42. $C \text{ œ } \$ \quad C \text{ œ } ($
 horizontal horizontal
 The lines are parallel.

43. $B \text{ œ } \frac{C \#}{\$} \quad \$ C \$ B \text{ œ } !$

$\$B \text{ œ } C \# \quad \$C \text{ * } B \text{ œ } !$

$C \text{ œ } \$B \# \quad \$C \text{ œ } B \text{ *}$

$C \text{ œ } \$B \# \quad C \text{ œ } \overline{B} \$$

$7 \text{ œ } \$ \quad 7 \text{ œ } \frac{\#}{\$}$

The lines are perpendicular.

44. $\#C \text{ œ }) \quad \$ \# B \text{ œ } \$ C \# /$

$C \text{ œ } \% \quad " \$B \text{ œ } \$C "$
 horizontal $\$C \text{ œ } \B
 $C \text{ œ } B$

$7 \text{ œ } "$

neither

45. $C C \text{ œ } 7 B B \text{ œ } "$
 $C \% \text{ œ } \# B \#$

$C \% \text{ œ } \# B \%$
 $\#B C \text{ œ } !$
 $\#B C \text{ œ } !$

46. $C C \text{ œ } 7 B B \text{ œ } "$
 $C \& \text{ œ } \$ B \$$

$C \& \text{ œ } \$ B \text{ *}$
 $\$B C \text{ œ } \% "$

47. $C C \text{ œ } 7 B B \text{ œ } "$ ☐\$

$C \# \text{ œ } \# C E B \#$

$C \text{ œ } \frac{\#}{\#} \text{ œ } \# B \$$

$\#C " \text{ œ } \% B "$

$\%B \#C \text{ œ } ($

$\%B \#C \text{ œ } ($

48. $C C \text{ œ } 7 B B \text{ œ } "$ $"$

$C \# \text{ œ } " \text{ œ } B \quad \% \square$

$C \# \text{ œ } " B \quad \frac{\#}{\#}$

$\#C \% \text{ œ } " \# B \$$

$" \# B \# C \text{ œ } "$

49. $C C \text{ œ } 7 B B \text{ œ } "$

$C " \text{ œ } \frac{\#}{\&} B "$

$\& C " \text{ œ } \# B "$

$\& C \& \text{ œ } \# B \#$

$\#B \& C \text{ œ } ($

$\#B \& C \text{ œ } ($

50. $C C \text{ œ } 7 B B \text{ œ } "$

$C \$ \text{ œ } B \# \frac{\&}{\&}$

$\& C \$ \text{ œ } B \#$

$\& C " \& \text{ œ } B \#$

$B \& C \text{ œ } "($

51. $C C \text{ œ } 7 B B \text{ œ } "$
 $C \$ \text{ œ } ! B "$
 $C \$ \text{ œ } !$
 $C \text{ œ } \$$

52. $C C \text{ œ } 7 B B \text{ œ } "$
 $C \& \text{ œ } ! B ($
 $C \& \text{ œ } !$
 $C \text{ œ } \&$

53. 7 is und Ê vertical
 B œ constant
 B œ "

EXERCISES 2.4

54. 7 is und \bar{E} vertical
 $B \in \text{constant}$
 $B \in \text{'}$

55. $C \ C'' \in 7 \ B \ B''$
 $C \ ! \in 1 \ B \ 1$
 $C \in 1 \ B \ 1\#$
 $1 \ B \ C \in 1\#$
 $1 \ B \ C \in 1\#$

56. $C \ C'' \in 7 \ B \ B''$
 $C \ 1 \in 1 \ B \ !$
 $C \ 1 \in 1 \ B$
 $1 \ B \ C \in 1$
 $1 \ B \ C \in 1$

57. From the graph, $7 \in \#$ and the line
 passes through $\#, \&$.

$C \ C'' \in 7 \ B \ B''$
 $C \ \& \in \frac{7}{\#} \ B \ \#$
 $\$ \ C \ \& \in \$ \ \dagger \ B \ \#$
 $\$ \ C \ \& \in \# \ B \ \#$
 $\$ \ C \ \& \in \# \ B \ \%$
 $\# \ B \ \$ \ C \in \text{'}$
 $\# \ B \ \$ \ C \in \text{'}$

58. From the graph, $7 \in \#$ and the line
 passes through $\$, \#$.

$C \ C'' \in 7 \ B \ B''$
 $C \ \# \in \frac{7}{\#} \ B \ \$$
 $\$ \ C \ \# \in \$ \ \dagger \ C \ \square \ B \ \$$
 $\$ \ C \ \text{' } \in \# \ B \ \$$
 $\$ \ C \ \text{' } \in \# \ B \ \text{'}$
 $\# \ B \ \$ \ C \in !$

59. $7 \in \frac{C\#}{C''} \in \frac{\% \ !}{\%} \in \frac{\%}{\%} \in \text{'}$
 $B\# \ B'' \ \% \ ! \ \%$
 $C \ C'' \in 7 \ B \ B''$
 $C \ ! \in \text{' } \ B \ !$
 $C \in B$

60. $7 \in \frac{C\#}{C''} \in \frac{! \ \&}{\&} \in \frac{\&}{\&} \in \text{'}$
 $B\# \ B'' \ ! \ \& \ \&$
 $C \ C'' \in 7 \ B \ B''$
 $C \ ! \in \text{' } \ B \ !$
 $C \in B$

61. $7 \in \frac{C\#}{C''} \in \frac{\$ \ \%}{\%} \in \frac{(\)}{\%} \in \frac{(\)}{\%}$
 $B\# \ B'' \ ! \ \$ \ \$ \ \$$
 $C \ C'' \in 7 \ B \ B''$
 $C \ \$ \in \frac{(\)}{\%} \ B \ !$
 $C \in \frac{(\)}{\%} \ B \ \$$

62. $7 \in \frac{C\#}{C''} \in \frac{) \ !}{\%} \in \frac{) \ \%}{\%} \in \%$
 $B\# \ B'' \ \text{' } \% \ \#$
 $C \ C'' \in 7 \ B \ B''$
 $C \ ! \in \% \ B \ \%$
 $C \in \% \ B \ \text{'}$

63. From the graph, $7 \in *$ and the line
 passes through $\#, \%$
 $C \ C'' \in 7 \ B \ B''$
 $C \ \% \in \frac{7}{\#} \ B \ \#$
 $\& \ \text{'}$

64. From the graph, $7 \in \text{'}$ and the line
 passes through $\#, \$$.
 $C \ C'' \in 7 \ B \ B''$
 $C \ \$ \in \frac{7}{\#} \ B \ \#$
 $\& \ \text{'}$

$C \times B$
 $C \oplus B$
 $C \ominus B$

EXERCISES 2.4
 $C \oplus B$
 $C \ominus B$
 $C \oplus B$

EXERCISES 2.4

65. $C \in B \ (\ C \ C' \in \mathbb{Z} \ B \ B'$
 $\mathbb{Z} \in \%$ $\frac{C \ ! \ \in \% B !}{C \in \% B}$
 Use $\mathbb{Z} \in \%$.

66. $B \in \$C \ "#$ $C \ C' \in \mathbb{Z} \ B \ B'$
 $\$C \in B \ "#$ $\frac{C \ ! \ \in \% B !}{\%}$
 $C \in \% B \ %$ $\frac{C \ \in \ \%}{\%}$
 $\mathbb{Z} \in \%$ $\frac{C \ \in \ \%}{\%}$
 Use $\mathbb{Z} \in \%$.

67. $\%B \ C \ \in \ ($ $C \ C' \in \mathbb{Z} \ B \ B'$
 $C \ \in \%B \ ($ $C \ \& \ \in \%B \ #$
 $C \ \in \%B \ ($ $C \ \& \ \in \%B \)$
 $\mathbb{Z} \ \in \%$ $\frac{C \ \in \%B \ \$}{C \ \in \%B \ \$}$
 Use $\mathbb{Z} \ \in \%$.

68. $C \ \$B \ \in \ "#$ $C \ C' \in \mathbb{Z} \ B \ B'$
 $C \ \in \$B \ "#$ $C \ \$ \ \in \%B \ '#$
 $\mathbb{Z} \ \in \%$ $C \ \$ \ \in \%B \ ')$
 Use $\mathbb{Z} \ \in \%$.

69. $B \ \in \&C \ \#$ $C \ C' \in \mathbb{Z} \ B \ B'$
 $\%B \ \in \&C \)$ $C \ \# \ \in \%B \ %$
 $\&C \ \in \%B \)$ $\&$
 $C \ \in B \ \&$ $_B \ _$
 $\%$ $\& \ \&$
 $\mathbb{Z} \ \in \%$ $\frac{C \ \in \%B \ \&}{C \ \in \%B \ \&}$
 Use $\mathbb{Z} \ \in \%$.

70. $B \ \in \&C \ \#$ $C \ C' \in \mathbb{Z} \ B \ B'$
 $\%B \ \in \&C \ \#!$ $\% \ \%$
 $\$C \ \in \%B \ \#!$ $C \ \& \ \in \%B \ \%$
 $C \ \in \%B \ _$ $C \ \& \ \in B \ \%$
 $\mathbb{Z} \ \in \%$ $\frac{C \ \in \%B \ _}{C \ \in \%B \ _}$
 Use $\mathbb{Z} \ \in \%$.

71. $C \ \in \%B \ ($ $C \ C' \in \mathbb{Z} \ B \ B'$
 $\mathbb{Z} \ \in \%$ $C \ ! \ \in \%B \ !$
 Use $\mathbb{Z} \ \in \%$.

72. $B \ \in \$C \ "#$ $C \ C' \in \mathbb{Z} \ B \ B'$
 $\$C \ \in B \ "#$ $\frac{C \ ! \ \in \%B !}{C \ \in \%B}$
 $C \ \in \%B \ %$
 $\mathbb{Z} \ \in \%$
 Use $\mathbb{Z} \ \in \%$.

73. $\%B \ C \ \in \ ($ $C \ C' \in \mathbb{Z} \ B \ B'$
 $C \ \in \%B \ ($ $C \ \& \ \in \%B \ #$
 $C \ \in \%B \ ($ $C \ \& \ \in \%B \ \%$
 $\mathbb{Z} \ \in \%$ $C \ \& \ \in B \ \%$
 Use $\mathbb{Z} \ \in \%$.

74. $C \ \$B \ \in \ "#$ $C \ C' \in \mathbb{Z} \ B \ B'$
 $C \ \in \$B \ "#$ $C \ \$ \ \in \%B \ '#$
 $\mathbb{Z} \ \in \%$ $C \ \$ \ \in \%B \ \%$
 Use $\mathbb{Z} \ \in \%$.

Use 7 œ .
%

EXERCISES 2.4

\$

C œ " B &
\$

EXERCISES 2.4

75. $B \text{ œ } \&C \#$ $C C \text{ œ } 7 B B$
 $\%B \text{ œ } \%C)$ $" \& "$
 $\&C \text{ œ } \%B)$ $C \# \text{ œ}$
 $\%C \text{ œ })$ $\% B \%$
 $\&C \text{ œ } \%B)$ $C \# \text{ œ } B \& \%$
 $\%$ $\%$
 $7 \text{ œ } -$ $C \text{ œ } B \% \$$
 Use $7 \text{ œ } \& \&$
 $\%$

76. $B \text{ œ } \frac{\$}{C} \&$ $C C \text{ œ } 7 B B$
 $\%B \text{ œ } \frac{\$}{C} \#!$ $" \frac{\$}{B} "$
 $\$C \text{ œ } \%B \#!$ $C \& \text{ œ } \frac{\%}{\$} \frac{\$}{\$}$
 $C \text{ œ } \frac{\%}{B} \frac{\#!}{\$}$ $C \& \text{ œ } \%B \%$
 $7 \text{ œ } \frac{\%}{\$}$ $C \text{ œ } \%B \%$
 Use $7 \text{ œ } \frac{\$}{\%}$

77. Since $C \text{ œ } \$$ is the equation of a horizontal line, any perpendicular line will be vertical. Find the midpoint:

$$B \text{ œ } \frac{\#}{\#} \text{ œ } \#; C \text{ œ } \frac{\%}{\#} \text{ œ } ($$

The vertical line through $\#, ($ is $B \text{ œ } \#$.

79. Since $B \text{ œ } \$$ is the equation of a vertical line, any parallel line will be vertical. Find the midpoint:

$$B \text{ œ } \frac{\#}{\#} \text{ œ } \&; C \text{ œ } \frac{\%}{\#} \text{ œ } \%$$

The vertical line through $\&, \%$ is $B \text{ œ } \&$.

81. Let $B \text{ œ}$ the number of years the truck has been owned and let $C \text{ œ}$ the value of the truck. Then two points on the line are

given: $!, \#\$!!!$ and $(, " * !!!$.

$$7 \text{ œ } \frac{\#\$!!!}{!} \text{ œ } \frac{" * !!!}{(} \text{ œ } \$\#!!!$$

$$C C \text{ œ } 7 B B$$

$$C \#\$!!! \text{ œ } \$\#!!! B !$$

$$C \#\$!!! \text{ œ } \$\#!!! B$$

$$C \text{ œ } \$\#!!! B \#\$!!!$$

78. Since $C \text{ œ })$ is the equation of a horizontal line, any parallel line will be horizontal. Find the midpoint:

$$B \text{ œ } \frac{\% \#}{\#} \text{ œ } \$; C \text{ œ } \frac{\#}{\#} \text{ œ } \&$$

The horizontal line through $\$, \&$ is $C \text{ œ } \&$.

80. Since $B \text{ œ } \$$ is the equation of a vertical line, any perpendicular line will be horizontal. Find the midpoint:

$$B \text{ œ } \frac{\#}{\#} \text{ œ } "; C \text{ œ } \frac{\#}{\#} \text{ œ } \$$$

The horizontal line through $" , \$$: $C \text{ œ } \$$.

82. Let $B \text{ œ}$ the number of years the laptop has been owned and let $C \text{ œ}$ the value of the laptop. Then two points on the line are

given: $!, \#(!!$ and $\%, \$!!!$.

$$7 \text{ œ } \frac{\#(!! \$!!!}{! \%} \text{ œ } \frac{\% \$!!!}{\%} \text{ œ } '!!!$$

$$C C \text{ œ } 7 B B$$

$$C \#(!! \text{ œ } '!!! B !$$

$$C \#(!! \text{ œ } '!!! B$$

$$C \text{ œ } '!!! B \#(!!$$

EXERCISES 2.4

83. Let B be the number of years the building has been owned and let C be the value of the building. Then two points on the line

$$\text{are given: } (0, 10000) \text{ and } (10, 0) .$$

$$7 \text{ } \frac{10000 - 10000B}{10} \text{ } = \frac{10000(1-B)}{10} \text{ } = 1000(1-B)$$

$$C = 1000(1-B)$$

$$C = 1000 - 1000B$$

$$C + 1000B = 1000$$

84. Let B be the number of years the house has been owned and let C be the value of the house. Then two points on the line

$$\text{are given: } (0, 10000) \text{ and } (10, 0) .$$

$$7 \text{ } \frac{10000 - 10000B}{10} \text{ } = \frac{10000(1-B)}{10} \text{ } = 1000(1-B)$$

$$C = 1000(1-B)$$

$$C = 1000 - 1000B$$

$$C + 1000B = 1000$$

85. Let B be the number of years the TV has been owned and let C be the value of the TV. Then two points on the line are

$$\text{given: } (0, 1000) \text{ and } (10, 0) .$$

$$7 \text{ } \frac{1000 - 1000B}{10} \text{ } = \frac{1000(1-B)}{10} \text{ } = 100(1-B)$$

$$C = 100(1-B)$$

$$C = 100 - 100B$$

$$C + 100B = 100$$

86. Let B be the number of years the radio has been owned and let C be the value of the radio. Then two points on the line are

$$\text{given: } (0, 100) \text{ and } (10, 0) .$$

$$7 \text{ } \frac{100 - 100B}{10} \text{ } = \frac{100(1-B)}{10} \text{ } = 10(1-B)$$

$$C = 10(1-B)$$

$$C = 10 - 10B$$

$$C + 10B = 10$$

Let B be \$ and find the value of C :

$$C = 10 - 10B$$

$$= 10 - 10(10) = 10 - 100 = -90$$

It will be worth \$270.

87. Let B be the number of years the copier has been owned and let C be the value of the copier. Then one point on the line is given: $(0, 1200)$. Since the copier depreciates by \$120 per year, $7 \text{ } \frac{1200 - 120B}{10} \text{ } = \frac{1200(1-B)}{10} \text{ } = 120(1-B)$

$$C = 120(1-B)$$

$$C = 120 - 120B$$

$$C + 120B = 120$$

Let B be) and find the value of C :

$$C = 120 - 120(10) = 120 - 1200 = -1080$$

$$= 120 - 1200 = -1080$$

88. Let B be the number of years the jet ski has been owned and let C be its value. Then two points on the line are given: $(0, 1000)$ and $(10, 0)$.

$$7 \text{ } \frac{1000 - 1000B}{10} \text{ } = \frac{1000(1-B)}{10} \text{ } = 100(1-B)$$

The salvage value will be \$90.

The jet ski depreciates at a rate of \$2300 per year.

EXERCISES 2.4

EXERCISES 2.4

89. Let B be the number of years the table has been owned and let C be the value of the table. Then one point on the line is given: $(1, 40)$. Since the table appreciates by \$40 per year, $C = 40B + 100$.

Let $B = 7$ and find the value of C :
 $C = 40(7) + 100 = 280 + 100 = 380$.
 The value will be \$380.

90. Let B be the number of years the clock has been owned and let C be the value of the clock. Then two points on the line are given: $(1, 100)$ and $(2, 150)$.
 $C = 50B + 50$

Let $B = 10$ and find the value of C :
 $C = 50(10) + 50 = 500 + 50 = 550$.
 It will be worth \$550.

91. Let B be the number of years the cottage has been owned and let C be the value of the

cottage. Then one point on the line is given: $(1, 3500)$. Since the cottage appreciates by \$3500 per year, $C = 3500B + 10000$.
 Let $B = 1$ and find the value of C :
 $C = 3500(1) + 10000 = 3500 + 10000 = 13500$.
 The purchase price was \$13,500.

92. Let B be the number of hours of service needed and let C be the total charge. Then two points

on the line are given: $(1, 10)$ and $(2, 20)$.
 $C = 10B$
 The hourly charge is \$10.

93. Let B be the hours of labor and let C be the labor charge. Then 7 be the hourly charge.
 $C = 7B$

Let $B = 33$ and find the value of C :
 $C = 7(33) = 231$.
 The charge will be \$231.

94. Let B be the number of hundreds of copies and let C be the total charge. Then 7 be the charge per copy and 5 be the fixed charge.

$C = 7B + 5$

Let $B = 7$ and find the value of C :
 $C = 7(7) + 5 = 49 + 5 = 54$.
 The charge will be \$54.

EXERCISES 2.4

95. Let B be the number of fires and let C be the population. Then two points on the line

$$7 \text{ are given: } \left(\frac{1}{1000}, \frac{1}{1000} \right) \text{ and } \left(\frac{1}{1000}, \frac{1}{1000} \right)$$

$$C \text{ are } \left(\frac{1}{1000}, \frac{1}{1000} \right) \text{ and } \left(\frac{1}{1000}, \frac{1}{1000} \right)$$

Let C be 100,000 and find the value of B:
 There will be about 838 fires when the population is 100,000.

96. Let B be the number of feet of gutter and let C be the total charge. Then 7 be the charge

per foot. One point on the line is given:
 $\left(\frac{1}{1000}, \frac{1}{1000} \right)$
 $C = 7B$
 $\frac{1}{1000} = 7 \cdot \frac{1}{1000}$
 $\frac{1}{1000} = \frac{7}{1000}$
 $1 = 7$
 Let B be 100 and find the value of C:
 $C = 7B = 700$
 It will cost \$700.

97. Let J replace B and G replace C. Then two points on the line are given:
 $\left(\frac{1}{1000}, \frac{1}{1000} \right)$ and $\left(\frac{1}{1000}, \frac{1}{1000} \right)$

$$7 \text{ are } \left(\frac{1}{1000}, \frac{1}{1000} \right) \text{ and } \left(\frac{1}{1000}, \frac{1}{1000} \right)$$

$$G \text{ are } \left(\frac{1}{1000}, \frac{1}{1000} \right) \text{ and } \left(\frac{1}{1000}, \frac{1}{1000} \right)$$

98. Two points on the line are given:
 $\left(\frac{1}{1000}, \frac{1}{1000} \right)$ and $\left(\frac{1}{1000}, \frac{1}{1000} \right)$

$$7 \text{ are } \left(\frac{1}{1000}, \frac{1}{1000} \right) \text{ and } \left(\frac{1}{1000}, \frac{1}{1000} \right)$$

$$C \text{ are } \left(\frac{1}{1000}, \frac{1}{1000} \right) \text{ and } \left(\frac{1}{1000}, \frac{1}{1000} \right)$$

99. Let C be the percent who smoke and let B be the # of years since 1974. Two

points are given: $\left(\frac{1}{1000}, \frac{1}{1000} \right)$ and $\left(\frac{1}{1000}, \frac{1}{1000} \right)$

$$7 \text{ are } \left(\frac{1}{1000}, \frac{1}{1000} \right) \text{ and } \left(\frac{1}{1000}, \frac{1}{1000} \right)$$

$$C \text{ are } \left(\frac{1}{1000}, \frac{1}{1000} \right) \text{ and } \left(\frac{1}{1000}, \frac{1}{1000} \right)$$

Let B be 100:
 $C = \frac{1}{1000} \cdot 100 = \frac{1}{10}$
 2% will smoke in 2024.

100. Let O replace B and 2 replace C. Then two points on the line are given:

$\left(\frac{1}{1000}, \frac{1}{1000} \right)$ and $\left(\frac{1}{1000}, \frac{1}{1000} \right)$

$$7 \text{ are } \left(\frac{1}{1000}, \frac{1}{1000} \right) \text{ and } \left(\frac{1}{1000}, \frac{1}{1000} \right)$$

$$2 \text{ are } \left(\frac{1}{1000}, \frac{1}{1000} \right) \text{ and } \left(\frac{1}{1000}, \frac{1}{1000} \right)$$

Let O be 100:
 $2 = \frac{1}{1000} \cdot 100 = \frac{1}{10}$
 He would be about 172 cm tall.

EXERCISES 2.4

101. Two points on the line are given:

$$C = \frac{1}{2}B + 10 \quad \text{and} \quad C = \frac{1}{3}B + 20$$

$$C = \frac{1}{2}B + 10$$

$$C = \frac{1}{3}B + 20$$

Let $B = 100$ and find the value of C :

$$C = \frac{1}{2}(100) + 10 = 60$$

$$C = \frac{1}{3}(100) + 20 = 53.33$$

The price will be \$75 in the year 2020.

103. The equation describing the production is $C = 15B - 100$, where B represents the number of years and C is the level

$$C = 15B - 100$$

$$C = 15(10) - 100 = 50$$

The production will be 1655 barrels per day.

102. Let January be represented by $B = 1$, and later months by $B = 2, 3, 4, 5, 6$. Let C represent the inventory. Then two points on the line are given:

$$C = \frac{1}{2}B + 10 \quad \text{and} \quad C = \frac{1}{3}B + 20$$

$$C = \frac{1}{2}B + 10$$

$$C = \frac{1}{3}B + 20$$

$$C = \frac{1}{2}(301) + 10 = 150.5$$

Let $B = 301$ and find the value of C :

$$C = \frac{1}{3}(301) + 20 = 120.33$$

The March inventory will be about 301.

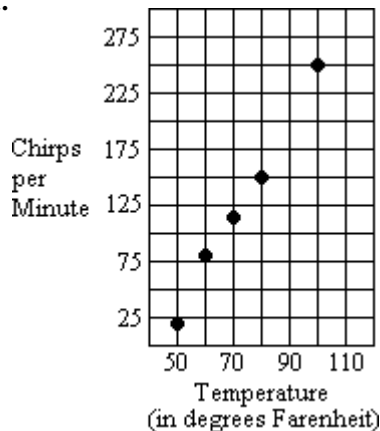
104. Let B be the number of years the piping has been owned and let C be the value of the piping. Then two points on the line are

$$C = \frac{1}{2}B + 10 \quad \text{and} \quad C = \frac{1}{3}B + 20$$

$$C = \frac{1}{2}B + 10$$

$$C = \frac{1}{3}B + 20$$

105. a.



b. Use $\frac{1}{2}B + 10$ and $\frac{1}{3}B + 20$ for the regression line.

$$C = \frac{1}{2}B + 10$$

$$C = \frac{1}{3}B + 20$$

$$C = \frac{1}{2}B + 10$$

$$C = \frac{1}{3}B + 20$$

$$C = \frac{1}{2}B + 10$$

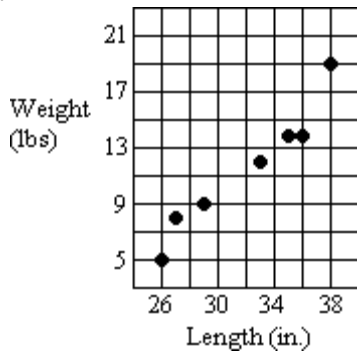
$$C = \frac{1}{3}B + 20$$

c. $C = \frac{1}{2}B + 10$

The rate will be about 204 chirps per minute.

EXERCISES 2.4

106. a.



b. Use #, & and \$), " for the regression line.

$$C \approx \frac{\sum Y_i}{n} - B \frac{\sum X_i}{n}$$

$$C \approx \frac{7}{5} - B \frac{18}{5}$$

$$C \approx \frac{7}{5} - B \frac{18}{5}$$

$$C \approx \frac{7}{5} - B \frac{18}{5}$$

c. $C \approx \frac{7}{5} - B \frac{18}{5}$

The weight will be about 12 pounds.

107. $C \approx \frac{\sum Y_i}{n} - B \frac{\sum X_i}{n}$

108. $C \approx \frac{\sum Y_i}{n} - B \frac{\sum X_i}{n}$

109-112. Answers may vary.

113. $C \approx \frac{\sum Y_i}{n} - B \frac{\sum X_i}{n}$

$$C \approx \frac{\sum Y_i}{n} - B \frac{\sum X_i}{n}$$

$$C \approx \frac{\sum Y_i}{n} - B \frac{\sum X_i}{n}$$

114. B-intercept: $B \approx \frac{\sum Y_i \sum X_i - \sum Y_i \sum X_i}{n \sum X_i^2 - (\sum X_i)^2}$

C-intercept: $C \approx \frac{\sum Y_i \sum X_i - \sum Y_i \sum X_i}{n \sum X_i^2 - (\sum X_i)^2}$

115-118. Answers may vary.

119. $EB + FC \approx G$

$FC \approx EB + G$

$C \approx \frac{E}{F} + \frac{G}{F}$

False. $7 \approx \frac{E}{F}$

120. $EB + FC \approx G$

$FC \approx EB + G$

$C \approx \frac{E}{F} + \frac{G}{F}$

C-intercept: $\frac{G}{F}$

121. Both are horizontal. True.

122. $\frac{E}{F} + \frac{G}{F} \approx \frac{E}{F} + \frac{G}{F}$; True.

123. $B \approx \frac{E}{F}$ is vertical, so the parallel line must be vertical too $B \approx \frac{E}{F}$. False.

124. $C \approx \frac{E}{F}$ is horizontal, so the perpendicular line must be vertical too $B \approx \frac{E}{F}$. True.

125. $\frac{E}{B} \approx \frac{E}{B}$

$\frac{E}{B} \approx \frac{E}{B}$

126. False. You can tell by calculating the slopes.

$B \approx \frac{E}{F} \approx \frac{E}{F}$; True.

EXERCISES 2.5

Exercises 2.5 (page 265)

- | | | | |
|---|---|---|--|
| 1. B-intercept | 2. C-axis | 3. axis of symmetry | 4. C-axis |
| 5. B-axis | 6. origin | 7. circle, center | 8. radius |
| 9. $B^{\#} C^{\#} \text{œ} < \#$ | | 10. $B^2 \# C^5 \#$ | $\text{œ} < \#$ |
| 11. $C \text{œ} B^{\#} \%$
! œ B # B #
B œ #, B œ #
B-int: #, !, #, ! | $C \text{œ} B^{\#} \%$
C œ !# %
C œ %
C-int: !, % | 12. $C \text{œ} B^{\#} *$
! œ B# *
! œ B \$ B \$
B œ \$, B œ \$
B-int: \$, !, \$, ! | $C \text{œ} B^{\#} *$
C œ !# *
C œ *
C-int: !, * |
| 13. $C \text{œ} \% B^{\#} \# B$
! œ #B #B "
B œ !, B œ " | $C \text{œ} \% B^{\#} \# B$
C œ % ! # # !
C œ ! | 14. $C \text{œ} \# B \% B^{\#}$
! œ #B " #B
B œ !, B œ " | $C \text{œ} \# B \% B^{\#}$
C œ # ! % ! #
C œ ! |
| B-int: !, !, ^, #, ! ₀₀ | C-int: !, ! | B-int: !, !, ^, #, ! ₀₀ | C-int: !, ! |
| 15. $C \text{œ} B^{\#} \% B \&$
! œ B " B &
B œ ", B œ &
B-int: ", !, &, ! | $C \text{œ} B^{\#} \% B \&$
C œ !# % ! &
C œ &
C-int: !, & | 16. $C \text{œ} B^{\#} " ! B \# "$
! œ B \$ B (
B œ \$, B œ (
B-int: \$, !, (, ! | $C \text{œ} B^{\#} " ! B \# "$
C œ !# " ! ! # "
C œ # "
C-int: !, # " |
| 17. $C \text{œ} B^{\#} B \#$
! œ B # B "
B œ #, B œ "
B-int: #, !, ", ! | $C \text{œ} B^{\#} B \#$
C œ !# ! #
C œ #
C-int: !, # | 18. $C \text{œ} B^{\#} \# B \$$
! œ B \$ B "
B œ \$, B œ "
B-int: \$, !, ", ! | $C \text{œ} B^{\#} \# B \$$
C œ !# # ! \$
C œ \$
C-int: !, \$ |
| 19. $C \text{œ} B^{\#} * B$
! œ B^B# *%
! œ B B \$ B \$
B œ !, B œ \$, B œ \$
B-int: !, !, \$, !, \$, ! | $C \text{œ} B^{\#} * B$
C œ !\$ * !
C œ !
C-int: !, ! | 20. $C \text{œ} B^{\#} B$
! œ B^B# "%
B œ !, ~B# " Á !™
B-int: !, ! | $C \text{œ} B^{\#} B$
C œ !\$ B
C œ !
C-int: !, ! |
| 21. $C \text{œ} B^{\#} "$
! œ ^B# "%^B# "%
! œ ^B# "% B " B "
~B# " Á !™
B œ ", B œ " | $C \text{œ} B^{\#} "$
C œ !% "
B
-
i
n | 22. $C \text{œ} B^{\#} \# \& B^{\#}$
! œ B#^B# #&%
t: ", !, ",
! | $C \text{œ} B^{\#} \# \& B^{\#}$
C œ !% #& ! #
C œ "
C-int: !, " |

! œ B# B & B &
B œ !, B œ &, B œ &
B-int: !, ! , &, ! , &, !

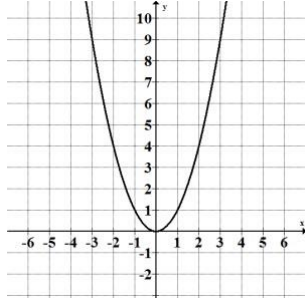
C œ ! **EXERCISES 2.5**
C-int: !, !

EXERCISES 2.5

23. $C \in B^\#$

B-int: !, !

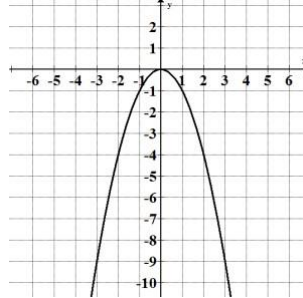
C-int: !, !



24. $C \in B^\#$

B-int: !, !

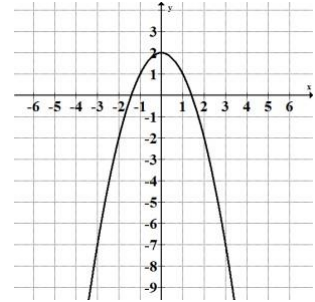
C-int: !, !



25. $C \in B^\# \#$

B-int: ŠÈ̄#, !<, ŠÈ̄̄#, !<

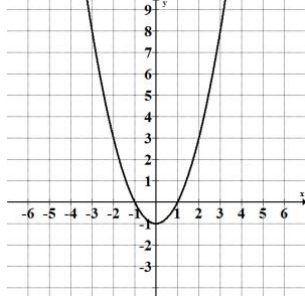
C-int: !, #



26. $C \in B^\# "$

B-int: ", !, ", !

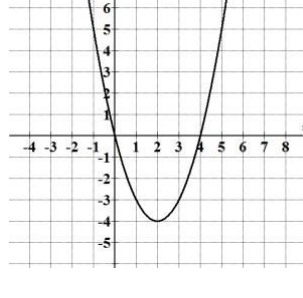
C-int: !, "



27. $C \in B^\# \%B$

B-int: !, !, %, !

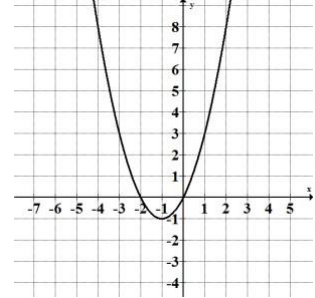
C-int: !, !, !



28. $C \in B^\# \#B$

B-int: !, !, #, !

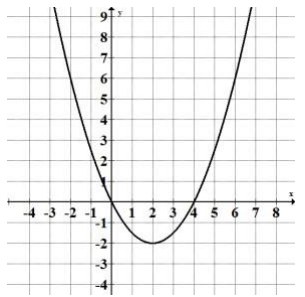
C-int: !, !



29. $C \in \overset{''}{B} \#B$
#

B-int: !, !, %, !

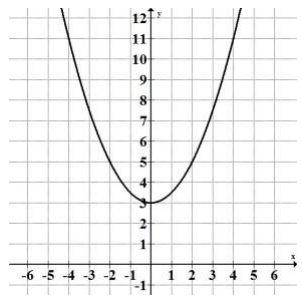
C-int: !, !



30. $C \in \overset{''}{B} \#B$
#

B-int: none

C-int: !, \$



EXERCISES 2.5

31. B-axis C-axis origin
 $C \oplus B^{\#} \#$ $C \oplus B^{\#} \#$ $C \oplus B^{\#} \#$
 not equivalent: no symmetry equivalent: symmetry not equivalent: no symmetry
32. B-axis C-axis origin
 $C \oplus \$B \#$ $C \oplus \$B \#$ $C \oplus \$B \#$
 not equivalent: no symmetry not equivalent: no symmetry not equivalent: no symmetry
33. B-axis C-axis origin
 $C^{\#} \# \oplus B$ $C^{\#} \# \oplus B$ $C^{\#} \# \oplus B$
 $C^{\#} \# \oplus B$ not equivalent: no symmetry $C^{\#} \# \oplus B$
 equivalent: symmetry not equivalent: no symmetry
34. B-axis C-axis origin
 $C^{\#} C \oplus B$ $C^{\#} C \oplus B$ $C^{\#} C \oplus B$
 $C^{\#} C \oplus B$ not equivalent: no symmetry $C^{\#} C \oplus B$
 not equivalent: no symmetry not equivalent: no symmetry
35. B-axis C-axis origin
 $C^{\#} \oplus B^{\#}$ $C^{\#} \oplus B^{\#}$ $C^{\#} \oplus B^{\#}$
 $C^{\#} \oplus B^{\#}$ $C^{\#} \oplus B^{\#}$ $C^{\#} \oplus B^{\#}$
 equivalent: symmetry equivalent: symmetry equivalent: symmetry
36. B-axis C-axis origin
 $C \oplus \$B ($ $C \oplus \$B ($ $C \oplus \$B ($
 not equivalent: no symmetry not equivalent: no symmetry not equivalent: no symmetry

EXERCISES 2.5

- 37.**
- | | | |
|-----------------------------|----------------------|-----------------------------|
| B-axis | C-axis | origin |
| C œ \$B# (| C œ \$ B# (| C œ \$ B # (|
| not equivalent: no symmetry | equivalent: symmetry | not equivalent: no symmetry |
-
- 38.**
- | | | |
|----------------------|----------------------|----------------------|
| B-axis | C-axis | origin |
| B# C # œ " | B # C# œ " | B # C # œ " |
| B# C# œ " | B# C# œ " | B# C# œ " |
| equivalent: symmetry | equivalent: symmetry | equivalent: symmetry |
-
- 39.**
- | | | |
|-----------------------------|-----------------------------|-----------------------------|
| B-axis | C-axis | origin |
| C œ \$B\$ (| C œ \$ B \$ (| C œ \$ B \$ (|
| not equivalent: no symmetry | not equivalent: no symmetry | C œ \$B\$ (|
| | | not equivalent: no symmetry |
-
- 40.**
- | | | |
|-----------------------------|-----------------------------|----------------------|
| B-axis | C-axis | origin |
| C œ \$B\$ (B | C œ \$ B \$ (B | C œ \$ B \$ (B |
| not equivalent: no symmetry | not equivalent: no symmetry | C œ \$B (B |
| | | C œ \$B\$ (B |
| | | equivalent: symmetry |
-
- 41.**
- | | | |
|----------------------|-----------------------------|-----------------------------|
| B-axis | C-axis | origin |
| C # œ \$B | C# œ \$ B | C # œ \$ B |
| C# œ \$B | C# œ \$B | C# œ \$B |
| equivalent: symmetry | not equivalent: no symmetry | not equivalent: no symmetry |
-
- 42.**
- | | | |
|-----------------------------|----------------------|-----------------------------|
| B-axis | C-axis | origin |
| C œ \$B% (| C œ \$ B% (| C œ \$ B % (|
| not equivalent: no symmetry | equivalent: symmetry | not equivalent: no symmetry |

EXERCISES 2.5

43. $C \in k B_k$

B-axis	C-axis	origin
$C \in k B_k$	$C \in k B_k$	$C \in k B_k$
not equivalent: no symmetry	$C \in k B_k$	$C \in k B_k$
	$C \in k B_k$	$C \in k B_k$

equivalent: not equivalent: no symmetry

44. $C \in k B_k$

B-axis	C-axis	origin
$C \in k B_k$	$C \in k B_k$	$C \in k B_k$
not equivalent: no symmetry	not equivalent: no symmetry	not equivalent: no symmetry

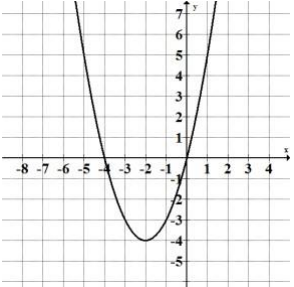
45. $k C_k \in B$

B-axis	C-axis	origin
$k C_k \in B$	$k C_k \in B$	$k C_k \in B$
$k C_k \in B$	not equivalent: no symmetry	$k C_k \in B$
$k C_k \in B$		$k C_k \in B$
equivalent: symmetry		not equivalent: no symmetry

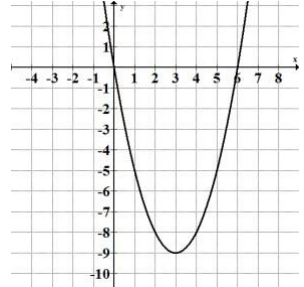
46. $k C_k \in k B_k$

B-axis	C-axis	origin
$k C_k \in k B_k$	$k C_k \in k B_k$	$k C_k \in k B_k$
$k C_k \in k B_k$	$k C_k \in k B_k$	$k C_k \in k B_k$
$k C_k \in k B_k$	$k C_k \in k B_k$	$k C_k \in k B_k$
equivalent: <input type="text" value="symmetry"/>	equivalent: <input type="text" value="symmetry"/>	equivalent: <input type="text" value="symmetry"/>

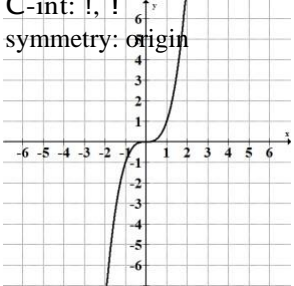
47. $C \in B^{\#} B$
 B-int: !, !, %, !
 C-int: !, !
 symmetry: none



48. $C \in B^{\#} B$
 B-int: !, !, %, !
 C-int: !, !
 symmetry: none

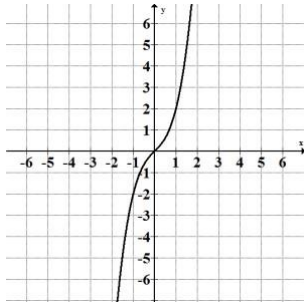


49. $C \in B^5$
 B-int: !, !
 C-int: !, !
 symmetry: origin

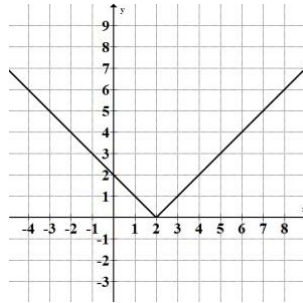


EXERCISES 2.5

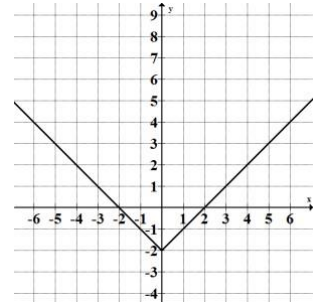
50. $C \in B_s B$
 B-int: !, !
 C-int: !, !
 symmetry: origin



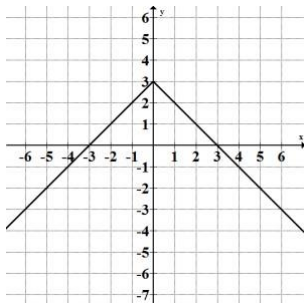
51. $C \in kB \#k$
 B-int: #, !
 C-int: !, #
 symmetry: none



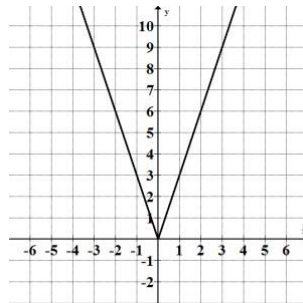
52. $C \in kBk \#$
 B-int: #, !, #, !
 C-int: !, #
 symmetry: C-axis



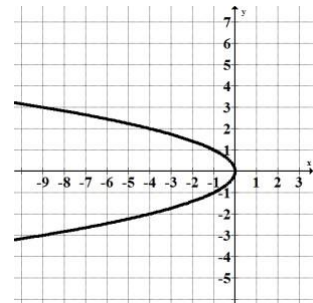
53. $C \in kBk \$$
 B-int: \$, !, \$, !
 C-int: !, \$
 symmetry: C-axis



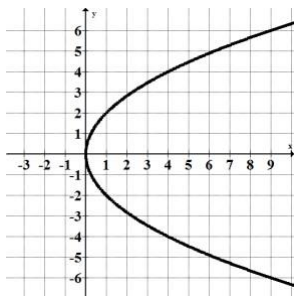
54. $C \in \$kBk$
 B-int: !, !
 C-int: !, !
 symmetry: C-axis



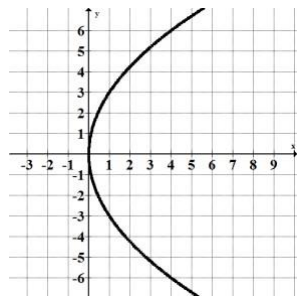
55. $C\# \in B$
 B-int: !, !
 C-int: !, !
 symmetry: B-axis



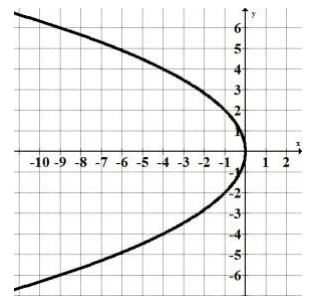
56. $C\# \in \%B$
 B-int: !, !
 C-int: !, !
 symmetry: B-axis



57. $C\# \in *B$
 B-int: !, !
 C-int: !, !
 symmetry: B-axis

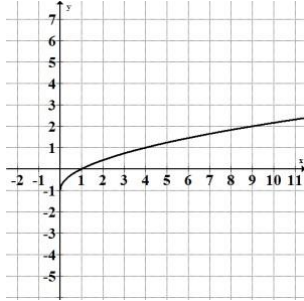


58. $C\# \in \%B$
 B-int: !, !
 C-int: !, !
 symmetry: B-axis

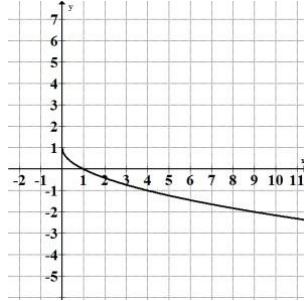


EXERCISES 2.5

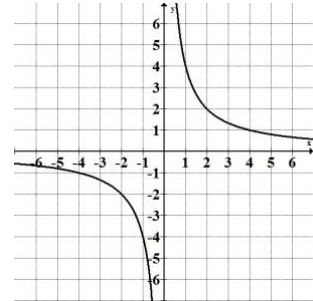
59. $C \in B$
 B-int: ", !
 C-int: !, "
 symmetry: none



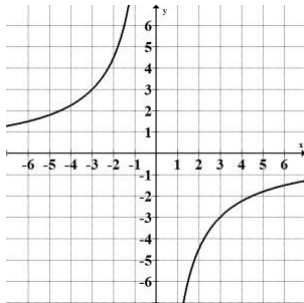
60. $C \in B$
 B-int: ", !
 C-int: !, "
 symmetry: none



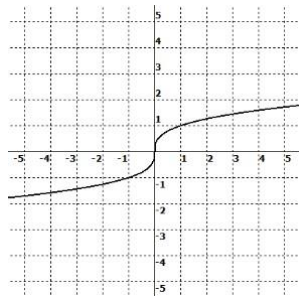
61. $BC \in \%$
 B-int: none
 C-int: none
 symmetry: origin



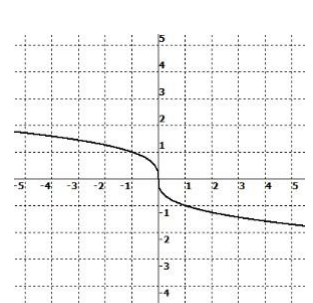
62. $BC \in *$
 B-int: none
 C-int: none
 symmetry: origin



63. $C \in B$
 B-int: !, !
 C-int: !, !
 symmetry: origin



64. $C \in B$
 B-int: !, !
 C-int: !, !
 symmetry: origin



65. $B \# C \in " ! !$
 $B ! \# C ! \# \in " ! \#$
 C: !, ! ; $\in \in " !$

66. $B \# C \in) " "$
 $B ! \# C ! \# \in * \#$
 C: !, ! ; $\in \in *$

67. $B \# C \& \# \in \% *$
 $B ! \# C \& \# \in (\#$
 C: !, & ; $\in \in ($

68. $B \# C \$ \# \in)$
 $B ! \# C \$ \# \in \check{E} < \# -$
 $B ! \# C \$ \# \in \check{E} \# < \# -$
 C: !, \$; $\in \in \check{E} \# -$

69. $B \# C \in " -$
 $B \# C ! \# \in \hat{\%} \#$

70. $B \& \# C \in " -$
 $B \& \# C ! \# \in \hat{\%} \#$

C: ' , ! ; < œ " #

EXERCISES 2.5 C: & , ! ; < œ &

EXERCISES 2.5

71. $B \% \# C " \# \text{œ} *$
 $B \% \# C " \# \text{œ} \$ \#$
 $C: \%, " ; < \text{œ} \$$
72. $B "" \# C (\# \text{œ} "\#"$
 $B "" \# C (\# \text{œ} ""\#$
 $C: "", (; < \text{œ} ""$
73. $\hat{B} " \% \# C \# \# \text{œ} \% \&$
 $\hat{B} " \% \# \bar{\%} C \# \# \text{œ} \check{E} \% \& < \# \text{—}$
 $\hat{B} " \% \# \bar{\%} C \# \# \text{œ} \check{S} \check{E} \& < \# \text{—}$
 $C: \hat{\%}, \#^{\%}; < \text{œ} \$ \check{E} \& \text{—}$
74. $\check{S} B \check{E} \& < \# C \$ \# \text{œ} "$
 $\check{S} B \check{S} \& < < \check{E} \text{—} \# C \$ \# \text{œ} " \#$
 $C: \check{S} \& \$ < \text{œ} "$
75. $B ! \# C ! \# \text{œ} \& \#$
 $B \# C \# \text{œ} \# \&$
76. $B ! \# C ! \# \text{œ} \check{S} \check{E} \$ < \#$
 $B \# C \# \text{œ} \$$
77. $B ! \# C ' \# \text{œ} ' \#$
 $B \# C ' \# \text{œ} \$ "$
78. $B ! \# C (\# \text{œ} * \#$
 $B \# C (\# \text{œ}) "$
79. $B) \# C ! \# \text{œ} \hat{\%} \# \text{—}$
 $B) \# C \# \text{œ} \text{—} \# \&$
80. $B "" \# C ! \# \text{œ} \check{S} \check{E} "" < \# \text{—}$
 $B "" \# C \# \text{œ} ""$
81. $B \# \# C "# \# \text{œ} "$ \#$
 $B \# \# C "# \# \text{œ} "" *$
82. $\hat{B} \# \% \# C \& \# \text{œ} (\#$
 $\hat{B} \# \% \# C \& \# \text{œ} \% *$
83. $B \# C \# \text{œ} "\# E B \# C \# " \text{œ} !$
84. $B \# C \# \text{œ} \% \# E B \# C \# "" \text{œ} !$
85. $B ' \# C) \# \text{œ} \% \# B \#$
 $" \# B \$ " C \# "" C ' \% \text{œ} ""$
 $B \# C \# " \# B "" C) \% \text{œ} !$
86. $B \& \# C \$ \# \text{œ} \# \# B \#$
 $" ! B \# \& C \# ' C * \text{œ} \% B \#$
 $C \# "" B ' C \$! \text{œ} !$
87. $B \$ \# C \% \# \text{œ} \check{S} \check{E} \# <$
 $B \# " B * C \#) C "" \text{œ} \#$
 $B \# C \# " B) C \# \$ \text{œ} !$
88. $B * \# C) \# \text{œ} \check{S} \# \check{E} \$ <$
 $B \# ") B)" C \# "" C ' \% \text{œ} "\#$
 $B \# C \# ") B "" C "$ \text{œ} !$

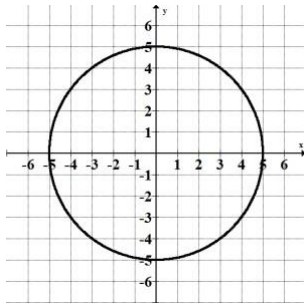
EXERCISES 2.5

89. Center: $B \text{ œ } \frac{\$ \$}{\#} \text{ œ } \$, C \text{ œ } \frac{\#)}{\#} \text{ œ } \$$
 < œ distance from center to endpoint
 $\text{œ } \acute{E} \$ \$ \$) \# \text{ œ } \&$
 $B \$ \# C \$ \# \text{ œ } \& \# B \#$
 $'B * C \# 'C * \text{œ } \# \&$
 $B \# C \# 'B 'C (\text{œ } !$
90. Center: $B \text{ œ } \frac{\& \&}{\#} \text{ œ } !, C \text{ œ } \frac{* *}{\#} \text{ œ } !$
 < œ distance from center to endpoint
 $\text{œ } \acute{E} ! \& \# ! * \# \text{œ } \acute{E} "'$
 $B ! \# C ! \# \text{œ } \acute{S} \acute{E} "' \#$
 $B \# C \# \text{œ } "'$
 $B \# C \# "' \text{œ } !$
91. < œ distance from center to origin
 $\text{œ } \acute{E} ! \$ \# ! \% \# \text{œ } \&$
 $B \$ \# C \% \# \text{œ } \& \#$
 $B \# 'B * C \#)C "' \text{œ } \# \&$
 $B \# C \# 'B)C \text{œ } !$
92. < œ distance from center to origin
 $\text{œ } \acute{E} ! \# \# ! ' \# \text{œ } \acute{E} \%!$
 $B \# \# C ' \# \text{œ } \acute{S} \acute{E} \% ! \#$
 $\# \#$
 $B \% B \% C "' \# C \$' \text{œ } \%!$
 $B \# C \# \% B "' \# C \text{œ } !$
93. $B \# C \# 'B \% C \% \text{œ } !$
 $B \# 'B C \# \% C \text{œ } \%$
 $B \# 'B * C \# \% C \% \text{œ } \% * \%$
 $B \$ \# C \# \# \text{œ } *$
94. $B \# C \# \% B)C \& \text{œ } !$
 $B \# \% B C \#)C \text{œ } \&$
 $B \# \% B \% C \#)C "' \text{œ } \& \% "'$
 $B \# \# C \# \% \text{œ } \# \&$
95. $B \# C \# "' B "' C \& (\text{œ } !$
 $B \# "' B C \# "' C \text{œ } \& ($
 $B \# "' B \# \& C \# "' C \$' \text{œ } \& (\# \& \$'$
 $B \& \# C ' \# \text{œ } \%$
96. $B \# C \# \# B ")C \& (\text{œ } !$
 $B \# \# B C \# ")C \text{œ } \& ($
 $B \# \# B " C \# ")C)" \text{œ } \& (")" "$
 $B " \# C * \# \text{œ } \# \&$
97. $\# B \# \# C \#)B "' C \# \# \text{œ } !$
 $B \# C \# \% B)C "' \text{œ } !$
 $B \# \% B C \#)C \text{œ } "'$
 $B \# \% B \% C \#)C "' \text{œ } "' \% "'$
 $B \# \# C \# \% \text{œ } *$

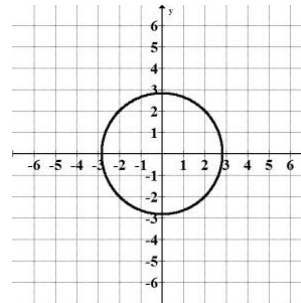
EXERCISES 2.5

98. $\$B^\# \ \$C^\# \ "B \ \$!C \ \$\ \text{œ} \ !$
 $B^\# \ C^\# \ \#B \ " !C \ " \ \text{œ} \ !$
 $B^\# \ \#B \ C^\# \ " !C \ \text{œ} \ "$
 $B^\# \ \#B \ " \ C^\# \ " !C \ \# \& \ \text{œ} \ " \ " \ \# \&$
 $B^\# \ \#C \ \& \ \# \ \text{œ} \ \# \&$

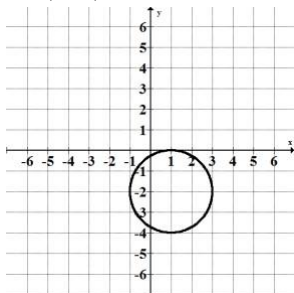
99. $B^\# \ C^\# \ \# \& \ \text{œ} \ !$
 $B^\# \ C^\# \ \text{œ} \ \# \&$
 $G \ !, \ !, \ , \ < \ \text{œ} \ \&$



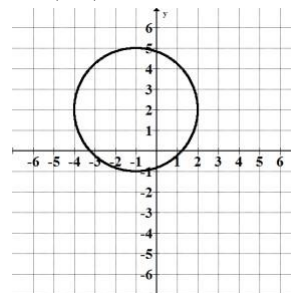
100. $B^\# \ C^\# \) \ \text{œ} \ !$
 $B^\# \ C^\# \ \text{œ} \)$
 $G \ !, \ !, \ , \ < \ \text{œ} \ \vec{E} \) \ \text{œ} \ \# \ \vec{E} \ \#$



101. $B^\# \ \# \ C^\# \ \# \ \text{œ} \ \%$
 $G \ " \ , \ \# \ , \ < \ \text{œ} \ \#$



102. $B^\# \ \# \ C^\# \ \# \ \text{œ} \ *$
 $G \ " \ , \ \# \ , \ < \ \text{œ} \ \$$



EXERCISES 2.5

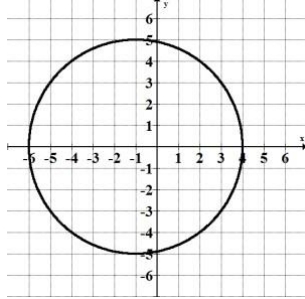
103. $B^2 C^2 + B^2 = 6$

$B^2 + B^2 C^2 = 6$

$B^2 + B^2 C^2 = 6$

$B^2 + B^2 C^2 = 6$

$G: x^2 + y^2 = 6$

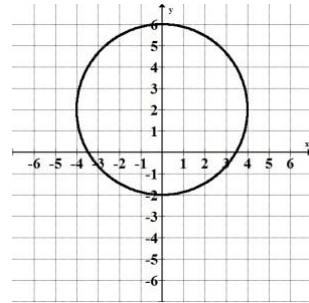


104. $B^2 C^2 + C^2 = 6$

$B^2 C^2 + C^2 = 6$

$B^2 C^2 + C^2 = 6$

$G: x^2 + y^2 = 6$



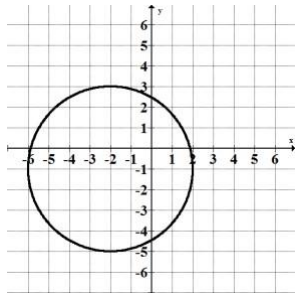
105. $B^2 C^2 + B^2 C^2 = 6$

$B^2 C^2 + B^2 C^2 = 6$

$B^2 C^2 + B^2 C^2 = 6$

$B^2 C^2 + B^2 C^2 = 6$

$G: x^2 + y^2 = 6$



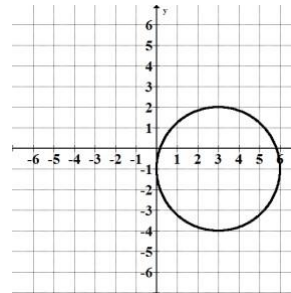
106. $B^2 C^2 + B^2 C^2 = 6$

$B^2 C^2 + B^2 C^2 = 6$

$B^2 C^2 + B^2 C^2 = 6$

$B^2 C^2 + B^2 C^2 = 6$

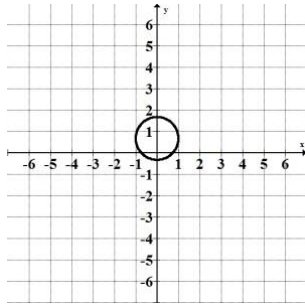
$G: x^2 + y^2 = 6$



EXERCISES 2.5

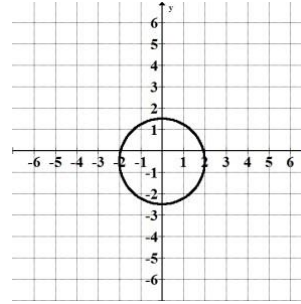
$$\begin{aligned}
 &*B\# *C\# \#C \text{ œ } \& \\
 &\# B\# C\# C \text{ œ } \& \\
 &B\# C\# \# C \text{ œ } \& \\
 &\# \# \\
 &- \square \\
 &B\# \text{œ} C \text{ œ } " \\
 &\# \text{ § }
 \end{aligned}$$

$$G\text{œ}!, \# \square < \text{œ} "$$



$$\begin{aligned}
 &\%B\# \%C\# \%C \text{ œ} " \& \\
 &B\# C\# C \text{ œ} " \& \\
 &\# \# \\
 &- \square \\
 &B\# \text{œ} C \text{ œ } \% \\
 &" \#
 \end{aligned}$$

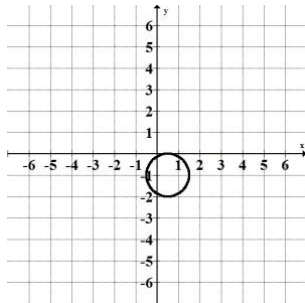
$$G\text{œ}!, \# \square < \text{œ} \#$$



$$\begin{aligned}
 &\%B\# \%C\# \%B \text{)} C \text{ " œ } ! \\
 &B\# C\# B \# C \text{ œ}
 \end{aligned}$$

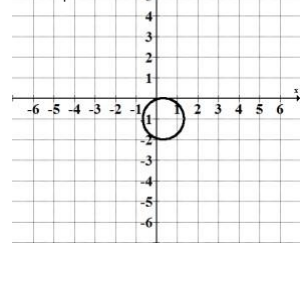
$$\begin{aligned}
 &B\# B \text{ " } \# \text{ } \% \text{ " } \\
 &\# \# \\
 &\% C \text{ #} C \text{ " œ } \% \text{ \% } \\
 &\# \\
 &\text{œ} B \text{ " } \square C \text{ " } \# \text{ œ } " \\
 &"
 \end{aligned}$$

$$G\text{œ}!, \# \square < \text{œ} "$$



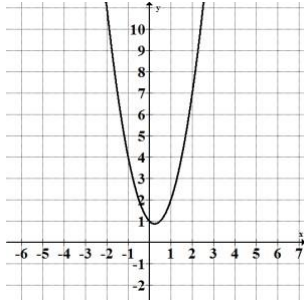
$$\begin{aligned}
 &*B\# *C\# "B \text{ ")C \text{ " œ } ! \\
 &\# \# \# \\
 &B C B \# C \text{ œ} \\
 &\# \# \text{ " } \# \text{ } * \text{ " } " \\
 &B \text{ B } \text{ C } \# C \text{ " œ } \text{ } \text{ } \\
 &\$ * \text{ } * \text{ } \\
 &\text{œ} B \text{ " } \square C \text{ " } \# \text{ œ } " \\
 &" \\
 &- \square
 \end{aligned}$$

$$G\text{œ}!, \# \square < \text{œ} "$$

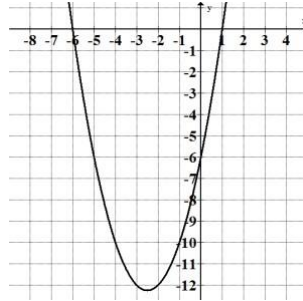


EXERCISES 2.5

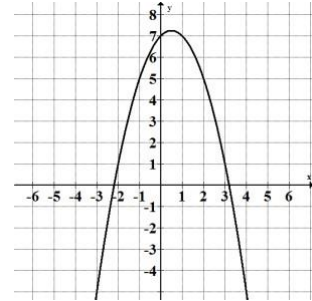
111. $C \propto B^2 - B$
Vertex: $(\frac{1}{2}, -\frac{1}{4})$



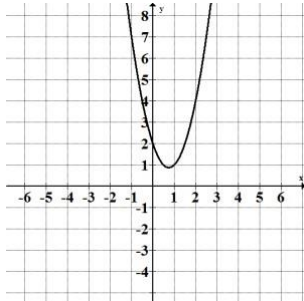
112. $C \propto B^2 + 8B - 1$
Vertex: $(-4, -17)$



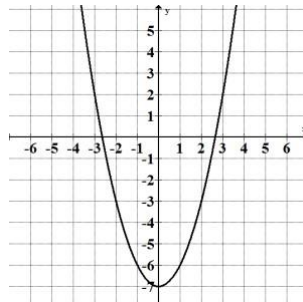
113. $C \propto -(B^2 - 2B + 1)$
Vertex: $(1, 0)$



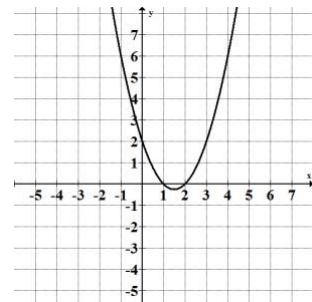
114. $C \propto B^2 - 2B + 1$
Vertex: $(1, 0)$



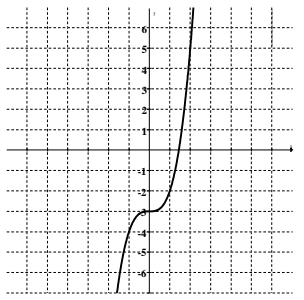
115. Graph $C \propto B^2 - 6B + 8$.
Find the B-intercepts.
 $B \propto 2$ & $B \propto 4$



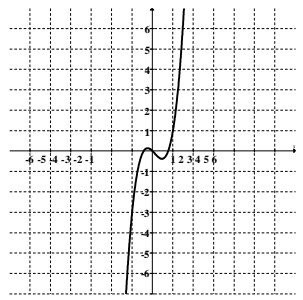
116. Graph $C \propto B^2 - 2B - 8$.
Find the B-intercepts.
 $B \propto -2$ & $B \propto 4$



117. Graph $C \propto B^2 - 2B - 8$.
Find the B-intercepts.
 $B \propto -2$ & $B \propto 4$



118. Graph $C \propto B^2 - 2B - 8$.
Find the B-intercepts.
 $B \propto -2$ & $B \propto 4$
 $B \propto 0$

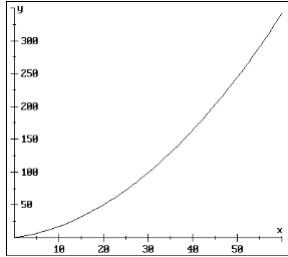


119. Let $C \propto -16t^2 + 64t$
 $C \propto -16t^2 + 64t$
 $-16t^2 + 64t = 0$
 $16t(-t + 4) = 0$
 $t = 0$ or $t = 4$
It strikes the ground after 4 seconds.

120. From #119, the flight lasts 4 seconds. Thus, half the flight is 2 seconds. Let $h \propto t^2$
 $h \propto 16t^2$
 $h \propto 16(2)^2 = 64$; The highest point is 64 feet above ground.

EXERCISES 2.5

121. $H \in \{b\}Z \# \{b^*Z\}$;



122. Refer to the graph for #121.

The C-coordinate for $B \in \{b\}$ is $C \in \{b^*\}$.

The C-coordinate for $B \in \{b^*\}$ is $C \in \{b^*\}$.

$\{b\} \in \{b^*\}$

At 60 mph, 243 more feet is required to stop than at 30 mph.

123. $\langle \in \{b\} \in \{b^*\}$

$B \{b\} \in C \{b^*\} \in \{b^*\}$
 $B \{b^*\} \in C \{b^*\} \in \{b^*\}$

124. $\langle \in \{b\} \in \{b^*\}$ in. $\in \{b^*\}$ in.

$B \{b\} \in C \{b^*\} \in \{b^*\}$
 $B \{b^*\} \in C \{b^*\} \in \{b^*\}$

125. $\langle \in \{b\} \in \{b^*\}$

$B \{b\} \in C \{b^*\} \in \{b^*\}$
 $B \{b^*\} \in C \{b^*\} \in \{b^*\}$

126. $\langle \in \{b\} \in \{b^*\}$

$B \{b\} \in C \{b^*\} \in \{b^*\}$
 $B \{b^*\} \in C \{b^*\} \in \{b^*\}$

127. $\langle \in \{b\} \in \{b^*\}$

$B \{b\} \in C \{b^*\} \in \{b^*\}$
 $\{b\} \in \{b^*\}$
 $B \{b^*\} \in C \{b^*\} \in \{b^*\}$

128.

First tire

$G \{b\}, \{b^*\}, \langle \in \{b\}$
 $B \{b\} \in C \{b^*\} \in \{b^*\}$
 $B \{b\} \in \{b\} \in C \{b^*\} \in \{b^*\}$
 $B \{b^*\} \in \{b^*\} \in C \{b^*\} \in \{b^*\}$

Second tire

$G \{b^*\}, \{b\}, \langle \in \{b^*\}$
 $B \{b^*\} \in C \{b\} \in \{b\}$
 $B \{b^*\} \in \{b^*\} \in C \{b\} \in \{b\}$
 $B \{b\} \in \{b\} \in C \{b^*\} \in \{b^*\}$

129-132. Answers may vary.

133. $B \{b\} \in C \{b^*\} \in \{b^*\}$

$B \{b\} \in \{b\} \in C \{b^*\} \in \{b^*\}$
 $B \{b^*\} \in \{b^*\} \in C \{b^*\} \in \{b^*\}$

134. $B \{b\} \in C \{b^*\} \in \{b^*\}$

$B \{b\} \in \{b\} \in C \{b^*\} \in \{b^*\}$
 $B \{b^*\} \in \{b^*\} \in C \{b^*\} \in \{b^*\}$

- 135.** False. The graphs are symmetric with respect to the C-axis. **EXERCISES 2.5**
- 136.** False. The graphs are symmetric with respect to the origin.

EXERCISES 2.5

137. True.

138. False. The line $C \in B$ has symmetry with respect to the origin, but not with respect to either the B- or C-axis.

139. True.

140. True.

141. False. The graph is the single point $\hat{\%}, \text{"}\frac{\%}{\%}$

142. True.

Exercises 2.6 (page 276)

1. quotient

2. ratios

3. means

4. extremes

5. extremes, means

6. $C \in 5B$

7. inverse

8. constant

9. joint

10. $B^{\#}, D$

11. $\frac{\%}{B} \in \frac{\#}{(}$
 $\% \dagger (\in \# \dagger B$

12. $\frac{\&}{\#} \in \frac{B}{\dagger}$
 $\& \dagger \dagger \in B \dagger \#$

$\#) \in \#B$
 $\text{"}\% \in B$

$\$! \in \#B$
 $\text{"}\& \in B$

13. $\frac{B}{\#} \in \frac{\$}{B \text{"}}$

14. $\frac{B \&}{\dagger} \in \frac{(}{) B}$

$B B \text{"} \in \$ \dagger \#$
 $B\# B \in \dagger$

$B\# B \dagger \in !$
 $B \$ B \# \in !$
 $B \in \$ or B \in \#$

$B \&) B \in (\dagger \dagger$
 $B\# \$B \%! \in \%\#$

$! \in B\# \$B \#$
 $! \in B \# B \text{"}$
 $B \in \text{"} or B \in \#$

15. Let $B \in$ the number of women.

$\& \in \#!$
 $\$ \dagger \$! \in \& \dagger B$
 $*! \in \&B$
 $\text{"}) \in B \hat{E}$ There are 18 women.

16. Let $B \in$ the number of bags of lime.

$\{ \in \#"$
 $\$ \dagger \# \text{"} \in B \dagger ($
 $\dagger \$ \in (B$
 $* \in B \hat{E}$ 9 bags of lime should be used.

17. $C \in 5B$
 $\text{"}\& \in 5 \$!$

18. $D \in 5 >$
 $\# \text{"} \in 5 ($

19. $M \in \frac{5}{5}$

$\text{"} \in 5$

$\$ \in 5$

$\&! \in \frac{\#}{\#!}$
 $\text{"}!!! \in 5$

EXERCISES 2.6

20. $V \propto \frac{5}{M^{\frac{1}{5}}}$
 $"!! \propto \frac{\# \& \#}{5}$
 $"!! \propto \frac{\#}{\# \&}$
 $\# \& !! \propto 5$
21. $I \propto 5MV$
 $"\# \& \propto 5 \& \# \&$
 $"\# \& \propto "\# \& 5$
 $" \propto 5$
22. $D \propto 5 B C$
 $\#) \propto 5 \# \&$
 $\#) \propto (5$
 $\% \propto 5$
23. $C \propto 5 B$ $C \propto \frac{\% \& B}{\% \& \dagger \&}$
 $"\& \propto 5 \%$ $C \propto \frac{\#}{\%}$
 $\frac{\% \&}{\%} \propto 5$ $C \propto \frac{\#}{\%}$
24. $A \propto 5 D$ $A \propto \$ D$
 $" \propto 5 \#$ $A \propto \$ \$$
 $\$ \propto 5$ $A \propto *$
25. $A \propto \frac{5}{\$}$ $A \propto \frac{\$!}{\&}$
 $"! \propto \frac{D}{\$}$ $A \propto \frac{D}{\&}$
 $\$! \propto 5$ $A \propto "$
26. $C \propto \frac{5}{\&}$ $C \propto \frac{\#!!}{\&}$
 $"!! \propto \frac{B}{\#}$ $C \propto \frac{B}{\&!}$
 $\#!! \propto 5$ $C \propto \%$
27. $T \propto 5 < =$ $T \propto \# \frac{<}{\&} =$
 $" \propto 5 \&)$ $T \propto \# \frac{\&}{\&} "!$
 $" \propto \% ! 5$ $T \propto)$
 $\frac{\&}{\&} \propto 5$
 $\frac{\&}{\&} \propto 5$
28. $7 \propto 5 8 \# \frac{\&}{\&};$ $7 \propto \$ 8 \# \frac{\&}{\&};$
 $\# \% \propto 5 \# \# \frac{\&}{\&}$ $7 \propto \$ \& \# \frac{\&}{\&}$
 $\# \% \propto 5 \% \#$ $7 \propto \$ \# \& \$$
 $\# \% \propto) 5$ $7 \propto \# \# \&$
 $\$ \propto 5$
29. direct 30. neither 31. neither 32. inverse
33. Let $B \propto$ the amount of caffeine.
 $\frac{\& \&}{\#} \propto \frac{B}{\%}$ $\frac{\% \&}{\#} \propto \frac{B}{\%}$ $\frac{\$ \&}{\#} \propto \frac{B}{\%}$
 $\& \dagger \% \propto "\# \dagger B$ $\% \dagger \% \propto "\# \dagger B$ $\$ \dagger \% \propto "\# \dagger B$
 $\# \% ! \propto "\# B$ $\# ! " \propto "\# B$ $" " \# \propto "\# B$
 $\# ! \# \text{ mg} , B$ $" \# \text{ mg} , B$ $" \$ " \text{ mg} , B$
34. Let $B \propto$ the number of phones.
 $\frac{\# \#}{\# \& !} \propto \frac{B}{\#) ! ! !}$
 $\# \# " \dagger \#) ! ! ! ! \propto \# \& ! \dagger B$
 $" ") ! ! ! ! \propto \# \& ! B$
 $\# \% (, \# ! \propto B$
 247,520 have cellular phones.
35. Let $B \propto$ the amount of adhesive needed.
 $" \propto \frac{B}{\& ! !}$
 $\cdot \& ! ! \propto "\% ! \dagger B$
 $\# \# \& ! \propto "\% ! B$
 $" \dagger (* , B$
 About 2 gallons of adhesive will be needed.

EXERCISES 2.6

36. Let B be the dosage.

$$\frac{B}{5} \approx \frac{B}{5}$$

The dosage should be B g, or B mg.

$$Z \approx \frac{5X}{T} \quad Z \approx \frac{\frac{1}{5}X}{\frac{1}{5}T}$$

$$\# \approx \frac{5 \$ \$!}{\%!$$

$$Z \approx \frac{\frac{1}{5} \$ \$!}{\&!}$$

$$\frac{)!!}{\$ \$!} \approx 5$$

$$Z \approx \frac{)!!!}{\&!}$$

$$\frac{)!!}{\$ \$} \approx 5$$

$$Z \approx \frac{)!!!}{\&!} \approx \frac{)!!!}{\&!} \text{ fts}$$

38. $0 \approx 5$, $0 \approx \# \&$
 $\& \approx 5 !\#$, $0 \approx \# \& !\# \$ \&$
 $\# \& \approx 5$, $0 \approx)\& \text{ Newtons}$

39. $\cdot \approx 5 > \#$, $\cdot \approx \text{"} > \#$
 $\text{"} \approx 5 \text{"} \#$, $\text{"} \% \approx \text{"} > \#$
 $\text{"} \approx 5$, $* \approx > \#$
 $\$ \approx > \hat{E} 3 \text{ seconds}$

$$T \approx \frac{5Z\#}{V\#} \quad T \approx \frac{Z\#}{V\#}$$

$$> \approx 56\# \quad > \approx 6\#$$

$$\text{"} \approx 5 \text{"} \#$$

$$\# \approx 6\#$$

$$\# \approx \frac{5 \#!}{\#!} \quad \% \approx \frac{Z}{\text{"}!$$

$$\text{"} \approx 5 \quad \hat{E}\# \approx 6 \hat{E} \hat{E}\# \text{ meters}$$

$$\%!! \approx \%!! 5 \quad \%!! \approx Z\#$$

$$\text{"} \approx 5 \quad \# \approx Z \hat{E} 20 \text{ volts}$$

$$42. \quad 0 \approx 5 \hat{E} X \quad 0 \approx \frac{\text{"} \% \hat{E} X}{\text{"} \%}$$

$$43. \quad M \approx \frac{5}{\#} \quad M \approx \frac{!!!}{\#}$$

$$\text{"} \% \approx 5 \hat{E} \# \quad 0 \approx \frac{\hat{E}\#}{\text{"} \% \hat{E}\#}$$

$$\frac{\cdot}{5} \quad M \approx \frac{\cdot!!!}{\#! \#}$$

$$\frac{\text{"} \%}{\hat{E}\#} \approx 5$$

$$\text{"}! \approx \frac{5}{\text{"}! \#}$$

$$M \approx \frac{\cdot!!!}{\%!! \#}$$

$$0 \approx \text{"} \% \hat{E} \quad 0 \approx \text{"} \% \$ \approx \% \$ \# \text{ hertz}$$

$$\text{"}!!! \approx 5$$

$$M \approx \text{"} \hat{E} 15 \text{ lumens}$$

44. $M \approx \frac{5}{\#}$, $M \approx \frac{\#\&!!}{\cdot \#}$
 $\text{"}!!! \approx \frac{\&\#}{\# \&!!}$, $M \approx \frac{\#\&!!}{\#\&!!}$
 $\text{"}!!! \approx \frac{5}{\#\&}$, $M \approx \frac{\#\&!!}{\#\&!!}$
 $\#\&!! \approx 5$, $M \approx \$ \hat{E} 36 \text{ lumens}$

45. $\text{"} \approx 57\# \approx 5 \#7 \ \$ @ \#$
 $\approx 5 \#7 \ \hat{\cdot} * @ \# \%$
 $\approx \text{"}) \dagger 57\#$
 The energy is multiplied by 18.

46. $T \approx 5VG\#$, $T \approx VG\#$
 $\text{"}! \approx 5 \text{"} \text{"} \#$, $T \approx \& \$ \#$

"! œ "!5
" œ 5

T œ & *
T œ %& watts

EXERCISES 2.6

EXERCISES 2.6

$$47. \quad K \propto \frac{57 \cdot 7\#}{\cdot \#} \propto \frac{5 \cdot \$7 \cdot \$7\#}{\# \cdot \#}$$

$$\propto \frac{5 \cdot 7 \cdot 7\#}{\# \cdot \#}$$

$$\propto \frac{5 \cdot 7 \cdot 7\#}{\# \cdot \#}$$

$$\propto \frac{5 \cdot 7 \cdot 7\#}{\# \cdot \#}$$

The force is multiplied by $\frac{5}{\#}$.

$$48. \quad K \propto \frac{57 \cdot 7\#}{\cdot \#} \propto \frac{5 \cdot \#7 \cdot \$7\#}{\# \cdot \#}$$

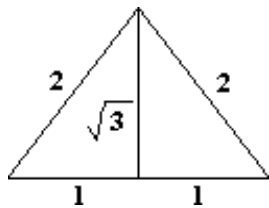
$$\propto \frac{5 \cdot 7 \cdot 7\#}{\# \cdot \#}$$

$$\propto \frac{5 \cdot 7 \cdot 7\#}{\# \cdot \#}$$

$$\propto \frac{5 \cdot 7 \cdot 7\#}{\# \cdot \#}$$

The force is multiplied by $\frac{5}{\#}$.

49. Consider this figure:



2 can be computed using the Pythagorean Theorem.

$$E \propto \frac{2}{\#} \propto \frac{2}{\#} \propto \frac{2}{\#}$$

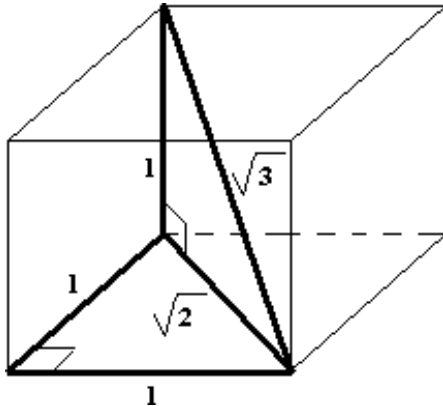
$$E \propto 5 = \#$$

$$\frac{E}{\#} \propto \frac{5}{\#} \propto \frac{5}{\#}$$

$$\frac{E}{\#} \propto \frac{5}{\#}$$

$$\frac{E}{\#} \propto 5$$

50. Consider this figure:



The diagonal is obtained by repeatedly using the Pythagorean Theorem.

$$\frac{1}{\#} \propto 5 =$$

$$\frac{E}{\#} \propto 5 =$$

$$\frac{E}{\#} \propto 5$$

51-58. Answers may vary.

59. d

60. c

61. b

62. a

63. c

64. d

65. a

66. b

Chapter 2 Review (page 279)

1. $D \propto \{e, \%, \&, \# \}$; $R \propto \{e, \&, \#, \mathbf{f}\}$
 Each element of the domain is paired with only one element of the range. Function.

2. $D \propto \{e, \#, \$, \mathbf{f}\}$; $R \propto \{e, \%, \&, \#, \mathbf{f}\}$
 $\#$ is both paired with $\%$ and $\&$. Not a function.

CHAPTER 2 REVIEW

3. $C \in \mathbb{R}$
 Each value of B is paired
 with only one value of C.
function

4. $C \in \mathbb{R} \cup \{0\}$
 $C \in \mathbb{R} \cup \{0\}$
 Each value of B is paired
 with only one value of C.
function

5. $C \in \mathbb{R} \cup \{0\}$
 $C \in \mathbb{R} \cup \{0\}$
 $C \in \mathbb{R} \cup \{0\}$
 Each value of B is paired
 with more than one value
 of C. **not a function**

6. $C \in \mathbb{R}$
 Each value of B is paired
 with only one value of C.
function

7. $0 \in B \subseteq C \subseteq \mathbb{R}$
 domain $\in \mathbb{R}, \infty$

8. $0 \in B \subseteq C \subseteq \mathbb{R}$
 domain $\in \mathbb{R}, \infty, \cup \mathbb{R}, \infty$

9. $0 \in B \subseteq C \subseteq \mathbb{R}$
 $\%B^{\#} \cup \{0\}$
 $\%B^{\#} \cup \{0\}$
 domain $\in \mathbb{R}, \# \cup \#, \# \cup \#, \infty$

10. $0 \in B \subseteq C \subseteq \mathbb{R}$
 domain $\in \mathbb{R}, \infty$

11. $0 \in B \subseteq C \subseteq \mathbb{R}$
 domain $\in \mathbb{R}, \infty$

12. $0 \in B \subseteq C \subseteq \mathbb{R}$
 $B^{\#} \cup \{0\}$
 domain $\in \mathbb{R}, \infty$

13. $0 \in B \subseteq \mathbb{R}$
 $0 \in \mathbb{R} \cup \{0\}$
 $0 \in \mathbb{R} \cup \{0\}$
 $0 \in \mathbb{R} \cup \{0\}$

14. $0 \in B \subseteq \mathbb{R}$
 $0 \in \mathbb{R} \cup \{0\}$
 $0 \in \mathbb{R} \cup \{0\}$
 $0 \in \mathbb{R} \cup \{0\}$
 $0 \in \mathbb{R} \cup \{0\}$

15. $0 \in B \subseteq \mathbb{R}$
 $0 \in \mathbb{R} \cup \{0\}$
 $0 \in \mathbb{R} \cup \{0\}$
 $0 \in \mathbb{R} \cup \{0\}$

16. $0 \in B \subseteq \mathbb{R}$
 $0 \in \mathbb{R} \cup \{0\}$
 $0 \in \mathbb{R} \cup \{0\}$
 $0 \in \mathbb{R} \cup \{0\}$
 $0 \in \mathbb{R} \cup \{0\}$

17. $\frac{0 \in B \subseteq \mathbb{R}}{2} \subseteq \frac{0 \in B \subseteq \mathbb{R}}{2} \subseteq \frac{0 \in B \subseteq \mathbb{R}}{2}$
 $\subseteq \frac{0 \in B \subseteq \mathbb{R}}{2} \subseteq \frac{0 \in B \subseteq \mathbb{R}}{2}$
 $\subseteq \frac{0 \in B \subseteq \mathbb{R}}{2} \subseteq \frac{0 \in B \subseteq \mathbb{R}}{2}$

CHAPTER 2 REVIEW

18.
$$\frac{0 - B - 2}{2} = \frac{0 - B - 2}{2}$$

$$\frac{c\#B\%B2 \#2\# (B (2 \$d c\#B\# (B \$d}{\#B\%B2 \#2\# (B (2 \$ \#B\# (B \$}$$

$$\frac{\%B2 \#2\# (2}{2} \approx \frac{2^2\%B \#2 (}{2} \approx \%B \#2 ($$

19.
$$\frac{0 - B}{2} \approx \frac{! \# B}{2} \approx \frac{! \# B}{2}$$

$$\frac{0 \%&}{2} \approx \frac{! \# \%&}{2} \approx \frac{! \# \%&}{2}$$

20. a.
$$\frac{M}{2} \approx \frac{\$ \& 2}{2} \approx \frac{\$ \& 2}{2}$$
 b.
$$\frac{M \#!!}{2} \approx \frac{\$ \& \#!!}{2} \approx \frac{\$ \& \#!!}{2}$$

21.
$$\frac{E \#}{2} \approx \frac{!}{2}$$

22.
$$\frac{F \#}{2} \approx \frac{!}{2}$$

23.
$$\frac{G \#}{2} \approx \frac{!}{2}$$

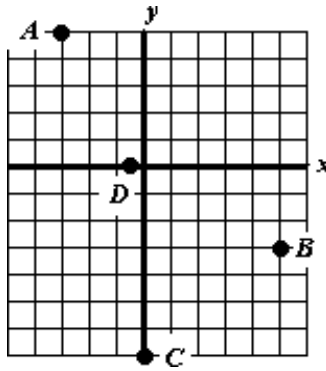
24.
$$\frac{H \#}{2} \approx \frac{!}{2}$$

25.
$$\frac{E \#}{2} \approx \frac{!}{2}$$

26.
$$\frac{F \#}{2} \approx \frac{!}{2}$$

27.
$$\frac{G \#}{2} \approx \frac{!}{2}$$

28.
$$\frac{H \#}{2} \approx \frac{!}{2}$$

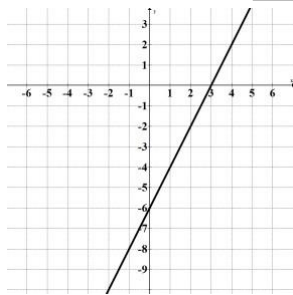


29.
$$\frac{\#B}{2} \approx \frac{C \#}{2}$$

$$\frac{C \#}{2} \approx \frac{\#B}{2}$$

B	C
!	#
#	!

$$C \# \approx \#B$$

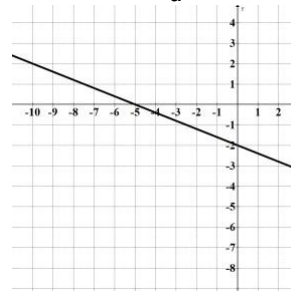


30.
$$\frac{\#B}{2} \approx \frac{\&C \#}{2}$$

$$\frac{\&C \#}{2} \approx \frac{\#B}{2}$$

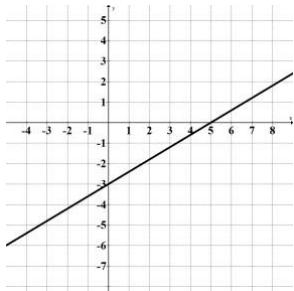
B	C
!	#
&	!

$$C \# \approx \#B$$

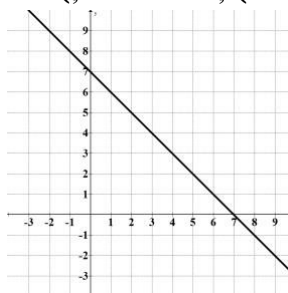


CHAPTER 2 REVIEW

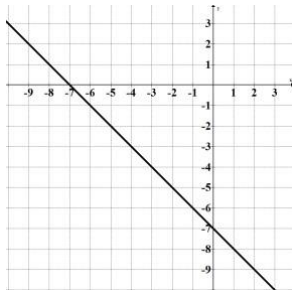
31. $B \subseteq C$ $C \subseteq B$
 $B \cap C = A$ $B \cap C = A$
 $B \cap C = A$ $B \cap C = A$
 $B \cap C = A$ $C \cap B = A$
 A, B A, C



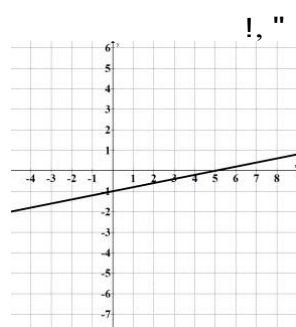
32. $B \subseteq C$ $C \subseteq B$
 $B \cap C = A$ $B \cap C = A$
 $B \subseteq C$ $C \subseteq B$
 A, B A, C



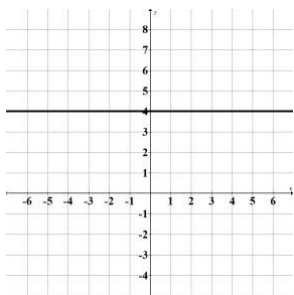
33. $B \subseteq C$ $C \subseteq B$
 $B \cap C = A$ $B \cap C = A$
 $B \subseteq C$ $C \subseteq B$
 A, B A, C



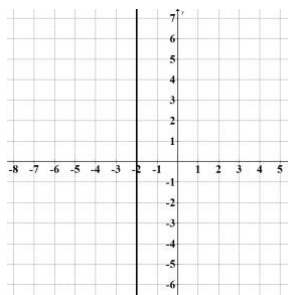
34. $B \subseteq C$ $C \subseteq B$
 $B \cap C = A$ $B \cap C = A$
 $B \subseteq C$ $C \subseteq B$
 A, B A, C



35. $C \subseteq A$ $A \subseteq C$



36. $B \subseteq A$ $A \subseteq B$



37. Let $B \subseteq A$: $C \subseteq A$ $B \subseteq C$ $A \subseteq B$ $A \subseteq C$ $B \subseteq C$ $A \subseteq B$ $A \subseteq C$

38. Let $B \subseteq A$: $C \subseteq A$ $B \subseteq C$ $A \subseteq B$ $A \subseteq C$ $B \subseteq C$ $A \subseteq B$ $A \subseteq C$

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$$39. \frac{B \cdot C}{B \cdot C} \cdot \frac{C \cdot C}{C \cdot C} = \frac{C \cdot C}{C \cdot C} = 1$$

$$40. \frac{B \cdot C}{B \cdot C} \cdot \frac{C \cdot C}{C \cdot C} = \frac{C \cdot C}{C \cdot C} = 1$$

$$41. \frac{B \cdot C}{B \cdot C} \cdot \frac{C \cdot C}{C \cdot C} = \frac{C \cdot C}{C \cdot C} = 1$$

$$42. \frac{B \cdot C}{B \cdot C} \cdot \frac{C \cdot C}{C \cdot C} = \frac{C \cdot C}{C \cdot C} = 1$$

$$43. \frac{B \cdot C}{B \cdot C} \cdot \frac{C \cdot C}{C \cdot C} = \frac{C \cdot C}{C \cdot C} = 1$$

$$44. \frac{B \cdot C}{B \cdot C} \cdot \frac{C \cdot C}{C \cdot C} = \frac{C \cdot C}{C \cdot C} = 1$$

$$45. \frac{B \cdot C}{B \cdot C} \cdot \frac{C \cdot C}{C \cdot C} = \frac{C \cdot C}{C \cdot C} = 1$$

$$46. \frac{B \cdot C}{B \cdot C} \cdot \frac{C \cdot C}{C \cdot C} = \frac{C \cdot C}{C \cdot C} = 1$$

$$47. 7 \cdot \frac{C \cdot C}{B \cdot B} = \frac{7 \cdot C \cdot C}{B \cdot B}$$

$$48. 7 \cdot \frac{C \cdot C}{B \cdot B} = \frac{7 \cdot C \cdot C}{B \cdot B}$$

$$49. 7 \cdot \frac{C \cdot C}{B \cdot B} = \frac{7 \cdot C \cdot C}{B \cdot B}$$

$$50. 7 \cdot \frac{C \cdot C}{B \cdot B} = \frac{7 \cdot C \cdot C}{B \cdot B}$$

$$51. 7 \cdot \frac{C \cdot C}{B \cdot B} = \frac{7 \cdot C \cdot C}{B \cdot B}$$

$$52. 7 \cdot \frac{C \cdot C}{B \cdot B} = \frac{7 \cdot C \cdot C}{B \cdot B}$$

$$53. C \cdot \frac{B \cdot C}{B \cdot B} = \frac{C \cdot B \cdot C}{B \cdot B}$$

B	C
!	*
"	*

$$54. C \cdot \frac{B \cdot C}{B \cdot B} = \frac{C \cdot B \cdot C}{B \cdot B}$$

B	C
!	*
&	(

55. The slope is zero.

CHAPTER 36 REVIEW The slope is undefined.

57. The slope is negative.

58. The slope is positive.

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59. 7ⁿ 7[#] œ & ^ " % œ "
 perpendicular

60. 7ⁿ Á 7[#]; 7ⁿ 7[#] œ # t (œ " Á "
 neither

61. 7 œ C_# Cⁿ œ " ! & œ &

62. 7 œ C_# Cⁿ œ " ! & œ &

7 œ $\frac{B\# B^n}{C\# C^n}$ œ $\frac{' \#}{C \#}$ œ &

7 œ $\frac{B\# B^n}{C\# C^n}$ œ $\frac{' \#}{\$ \&}$ œ }

B# Bⁿ " ! #)
) C # œ &)
) C " " œ % !
) C œ & "
 C œ (

B# Bⁿ B # &
 &) œ) B #
 % ! œ) B " "
) B œ # %
 B œ \$

63. 7 œ $\frac{?C}{?B}$ œ $\frac{\$!!!}{"}\&$ œ #!! ft per minute

64. 7 œ $\frac{?C}{?B}$ œ $\frac{"%(&!! \&! ,!!!}{\$ "}$ œ $\frac{*(, &!!}{\#}$ œ %) , (&! per year

65. C œ 7B ,
 C œ # B \$
 \$

66. C œ 7B ,
 C œ \$ B &
 #

67. \$B #C œ " !
 #C œ \$B " !
 C œ \$ B &
 7 œ \$, !, &
 #

68. #B %C œ)
 %C œ #B)
 C œ " # #
 7 œ " # !, #
 #

69. #C œ \$B " !
 C œ \$ B &
 7 œ \$, !, &

70. #B œ %C)
 %C œ #B)
 C œ " B #
 7 œ " # !, #
 #

71. &B #C œ (
 #C œ &B (
 C œ & B (
 7 œ & ^ !, (%
 # #

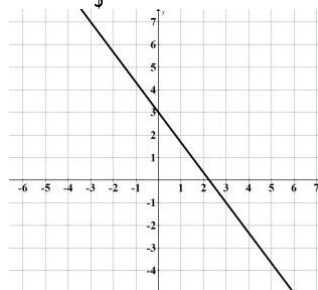
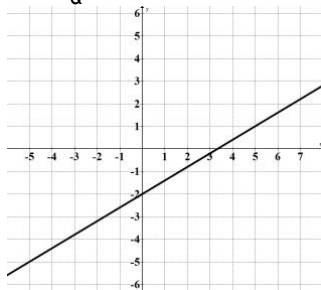
72. \$B %C œ " %
 %C œ \$B " %
 C œ \$ B (
 7 œ \$, ^ !, (%
 % #

73. C œ \$ B #

74. C œ % B \$

7 œ $\frac{\& \$}{\&}$, , œ #

7 œ $\frac{\$ \%}{\$}$ œ \$



CHAPTER 2 REVIEW

75. $C \propto B$) $\#C \propto B$ "*"
 $7 \propto \$$ $C \propto B$ "*"
 $7 \propto \$$

The lines are parallel.

76. $\#B \ \$C \propto "$ $\$B \ \#C \propto "&$
 $\$C \propto \#B$ " $\#C \propto \$B$ "&
 $C \propto \#B$ # $C \propto \#B$ "&#

$7 \propto \#$ $7 \propto \$$

The lines are perpendicular.

77. $7 \propto \frac{C\#}{C}$ $\propto \frac{C!}{C}$ $\propto C$

$B\# \ B" \ \& \ ! \ \&$

$C \ C" \ \propto \ 7 \ B \ B"$

$C \ ! \ \propto \ B \ !$

$C \ \propto \ B$

$\&C \ \propto \ \&E \ \frac{C}{\&} \ B \square$

$\&C \ \propto \ (B$

$(B \ \&C \ \propto \ !$

78. $C \ C \ \propto \ 7 \ B \ B$

$C \ " \ \propto \ \% \ B \ #$

$C \ " \ \propto \ \% \ B \)$

$\%B \ C \ \propto \ ($

79. $C \ C \ \propto \ 7 \ B \ B$

$C \ " \ \propto \ B \ #$

$\&C \ " \ \propto \ \& \ \dagger \ " \ \frac{B}{\&} \ # \ \bullet$

$\&C \ \& \ \propto \ B \ #$

$\&C \ \& \ \propto \ B \ #$

$B \ \&C \ \propto \ \$$

80. $7 \propto \frac{C\#}{C}$ $\propto \frac{!}{\&}$ $\propto \frac{!}{\&}$ $\propto \#$

$B\# \ B" \ \% \ (\ \$$

$C \ C" \ \propto \ 7 \ B \ B"$

$C \ \& \ \propto \ \# \ B \ ($

$C \ \& \ \propto \ \#B \ "%$

$\#B \ C \ \propto \ *$

81. $7 \propto ! \hat{E}$ horizontal
 $C \propto "($

82. 7 is undefined \hat{E} vertical
 $B \propto \&$

83. $\$B \ \%C \ \propto \ ($
 $\%C \ \propto \ \$B \ ($

$C \ \propto \ \$$ $($

$\%$ $\%$

$7 \ \propto \ \%$

Use $7 \ \propto \ \%$

$C \ C" \ \propto \ 7 \ B \ B"$

84. $7 \propto \frac{C\#}{C}$ $\propto \frac{!}{\%}$ $\propto \ ($

$C \ C" \ \propto \ 7 \ B \ B"$
 $C \ \# \ \propto \ (\ B \ ($

$C \ \# \ \propto \ (B \ \%*$

$C \ \propto \ (B \ \% ($

C ! œ - B #
C œ - B \$
% #

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85. $B = C \cdot \frac{\$}{\%}$
 $\$ = C \cdot B \cdot \%$

$$C = \frac{B \cdot \%}{\$}$$

$$7 = \frac{\$}{\%}$$

Use $7 = \frac{\$}{\%}$.
 $C = \frac{B \cdot \%}{\$} = \frac{B \cdot \%}{7 \cdot B \cdot \%}$
 $C = \frac{\$}{7 \cdot \%}$
 $C = \frac{\$}{7 \cdot \%}$
 $C = \frac{\$}{7 \cdot \%}$

86. $7 = \frac{C \cdot C}{B \cdot B} = \frac{C^2}{B^2}$
 Use $7 = \frac{C^2}{B^2}$.

$$C = \sqrt{7} \cdot B$$

$$C = \sqrt{7} \cdot B$$

$$C = \sqrt{7} \cdot B$$

$$C = \sqrt{7} \cdot B$$

87. Let B be the number of rolls hung and let C be the total charge. Then two points on

the line are given: $(1, 10)$ and $(2, 20)$
 $7 = \frac{20 - 10}{2 - 1} = \frac{10}{1} = 10$

$$C = 10B + 0$$

$$C = 10B$$

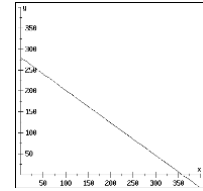
$$C = 10B$$

$$C = 10B$$

Let $B = 1$:
 $C = 10 \cdot 1 = 10$. The charge is \$10.

88. $B = 140$ hours of tutoring Spanish
 Let $B = 140$:

$$C = 10B = 10 \cdot 140 = 1400$$



140 hours of tutoring Spanish

89. $C = \frac{\$}{\%} B$ $C = \frac{\$}{\%} B$
 $! = \frac{\$}{\%} B$ $C = \frac{\$}{\%} B$
 $B = !, B = \frac{\$}{\%}$ $C = !$
 B-int: $!, !, \frac{\$}{\%}, !$ C-int: $!, !$

90. $C = B \cdot \frac{\$}{\%}$ $C = B \cdot \frac{\$}{\%}$
 $! = B \cdot \frac{\$}{\%}$ $C = ! \cdot \frac{\$}{\%}$
 $B = \frac{\$}{\%}, B = \frac{\$}{\%}$ $C = \frac{\$}{\%}$
 B-int: $\frac{\$}{\%}, !, \frac{\$}{\%}, !$ C-int: $!, \frac{\$}{\%}$

91. $C = B$

B-axis	C-axis	origin
$C = B$	$C = B$	$C = B$
$C = B$	$C = B$	$C = B$
equivalent: symmetry	not equivalent: no symmetry	not equivalent: no symmetry

92. $C = \frac{\$}{\%} B$

B-axis	C-axis	origin
$C = \frac{\$}{\%} B$	$C = \frac{\$}{\%} B$	$C = \frac{\$}{\%} B$
$C = \frac{\$}{\%} B$	$C = \frac{\$}{\%} B$	$C = \frac{\$}{\%} B$
not equivalent: no symmetry	$C = \frac{\$}{\%} B$	$C = \frac{\$}{\%} B$

CHAPTER REVIEW
equivalent: Symmetry not equivalent: no symmetry

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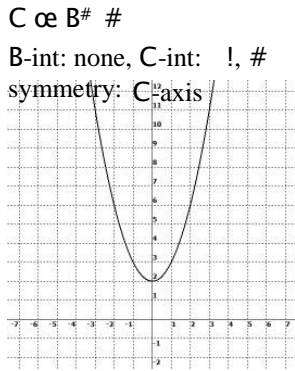
93.

B-axis	C-axis	origin
$C \propto k B k$	$C \propto k B k$	$C \propto k B k$
$C \propto k B k$	$C \propto k k B k$	$C \propto k B k$
not equivalent: no symmetry	equivalent: symmetry	$C \propto k k B k$
		not equivalent: no symmetry

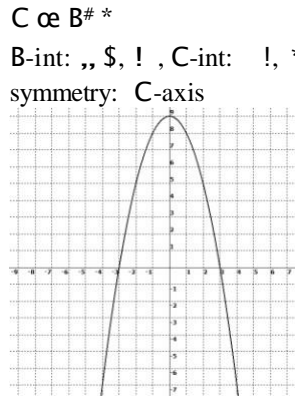
94.

B-axis	C-axis	origin
$C \propto k B \# k$	$C \propto k B \# k$	$C \propto k B \# k$
not equivalent: no symmetry	not equivalent: no symmetry	not equivalent: no symmetry

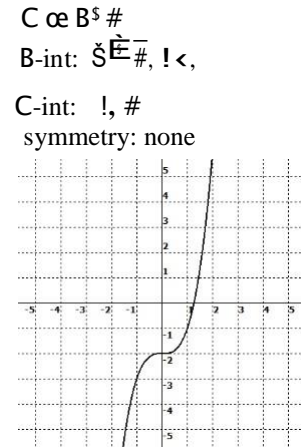
95.



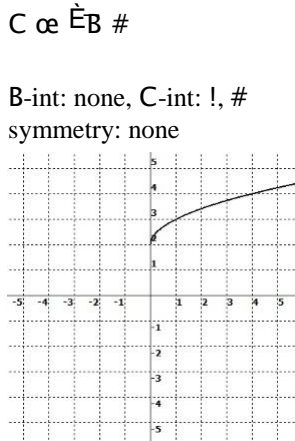
96.



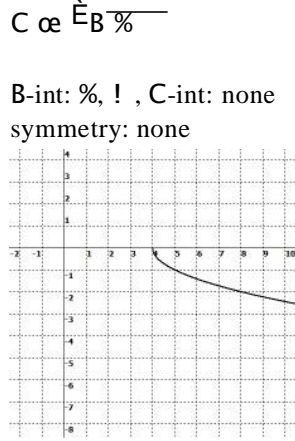
97.



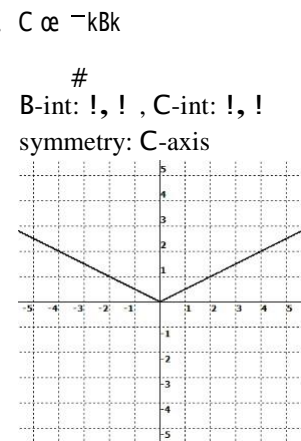
98.



99.

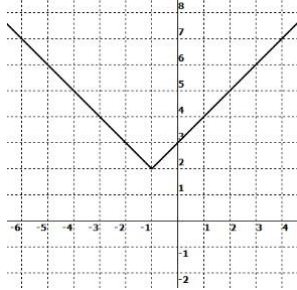


100.

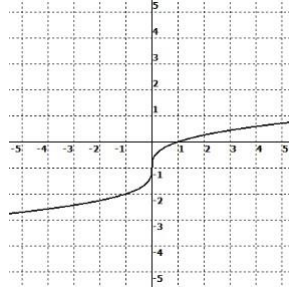


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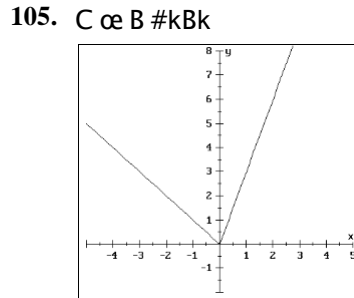
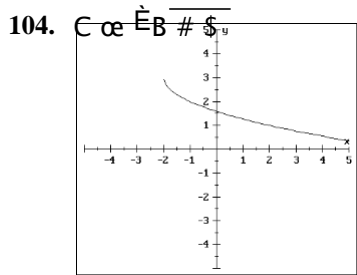
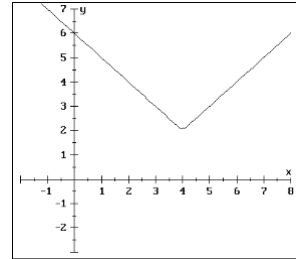
101. $C \in \mathbb{R}^k$ "k #
 B-int: none, C-int: !, \$
 symmetry: none



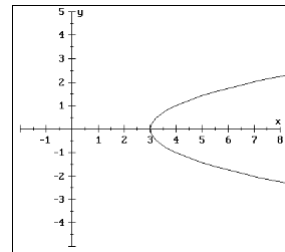
102. $C \in \mathbb{R}^{\bar{B}}$ "
 B-int: ", !, C-int: !, "
 symmetry: none



103. $C \in \mathbb{R}^k$ %k #



106. $C \in \mathbb{R}^B$ \$
 Graph $C \in \mathbb{R}^{\bar{B}}$ \$P



107. $B \# C \in \mathbb{R}^{\%}$
 $B ! \# C ! \# \in \mathbb{R}^{\#}$
 $C: !, ! ; < \in \mathbb{R}^{\#}$

108. $B \# C \# \in \mathbb{R}^{\%} ! !$
 $B ! \# C \# \in \mathbb{R}^{\%} ! \#$
 $C: !, ' ; < \in \mathbb{R}^{\%} !$

109. $B (\# C \# \in \mathbb{R}^{\%}$
 $B (\# C ! \# \in \mathbb{R}^{\%} \#$
 $C: (, ! ; < \in \mathbb{R}^{\%} \#$

110. $B \& \# C \# \in \mathbb{R}^{\%} *$
 $B \& \# C \# \in \mathbb{R}^{\%} \#$
 $C: \&, " ; < \in \mathbb{R}^{\%} _$

111. $B ! \# C ! \# \in \mathbb{R}^{\#}$
 $B \# C \# \in \mathbb{R}^{\%} *$

112. $B \$ \# C ! \# \in \mathbb{R}^{\%} \#$ &
 $B \$ \# C \# \in \mathbb{R}^{\%} \# \&$

113. $B \# \# C \# \# \in \mathbb{R}^{\%} \& \#$
 $B \# \# C \# \# \in \mathbb{R}^{\%} \# \&$

114. $\hat{B} \# \# \# C \& \# \in \mathbb{R}^{\%} *$
 $\hat{B} \# \# \# C \& \# \in \mathbb{R}^{\%} "$

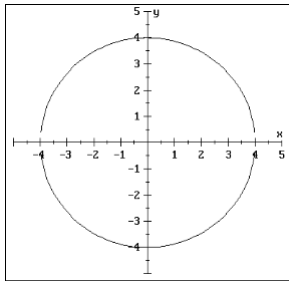
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115. $G \text{ , } \% ; < \text{ œ } \text{ " } \#$
 $B \ 2 \ \# \ C \ 5 \ \# \ \text{ œ } < \#$
 $B \ \$ \ \# \ C \ \% \ \# \ \text{ œ } \text{ " } \% \%$

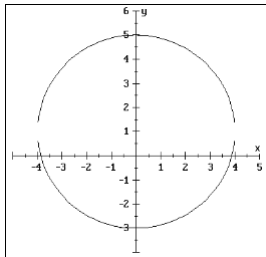
or $B \# \ C \# \ \text{ " } B \) C \ \text{ " " " } * \text{ œ } !$

117. $B \# \ C \# \ \text{ " } B \ \% C \ \% \text{ œ } !$
 $B \# \ \text{ " } B \ C \# \ \% C \text{ œ } \%$
 $B \# \ \text{ " } B \ * \ C \# \ \% C \ \% \text{ œ } \% \ * \ \%$
 $B \ \$ \ \# \ C \ \# \ \text{ œ } *$

119. $B \# \ C \# \ \text{ " " } \text{ œ } !$
 $B \ ! \ \# \ C \ ! \ \# \ \text{ œ } \text{ " " }$
 $G \ ! \ , \ ! \ , \ < \text{ œ } \%$



121. $B \# \ C \# \ \# C \text{ œ } \text{ " } \&$
 $B \# \ C \# \ \# C \ \text{ " } \text{ œ } \text{ " } \& \ \text{ " }$
 $B \# \ C \ \text{ " } \# \text{ œ } \text{ " " }$
 $\text{ ; } ! \ , \ \text{ " } \ , \ < \text{ œ } \%$



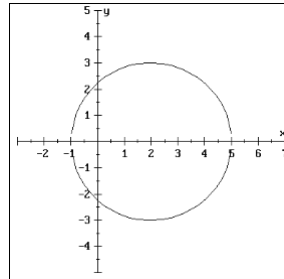
116. Center: $B \text{ œ } \frac{\text{ " } \& \ \text{ " }}{\#} \text{ œ } \frac{\text{ " }}{\#}$
 $C \text{ œ } \frac{\text{ \$ } \)}{\#} \text{ œ } \frac{\&}{\#}$

$< \text{ œ } \text{ distance from center to endpoint}$
 $\text{ œ } \acute{E} \hat{\text{ " }} \frac{\& \% \#}{\#} \ \hat{\&} \frac{\#}{\#} \text{ œ } \acute{E} \text{ " } \#$

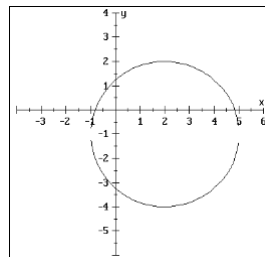
$\hat{B} \ \text{ " } \% \frac{\#}{\#} \hat{C} \ \& \ \% \frac{\#}{\#} \text{ œ } \text{ " } \# \ , \ \text{ or }$
 $B \# \ C \# \ B \ \& \ C \ \& \% \text{ œ } !$

118. $\# B \# \ \# C \# \) B \ \text{ " } C \ \text{ " } ! \text{ œ } !$
 $B \# \ C \# \ \% B \) C \ \& \ \text{ œ } !$
 $B \# \ \% B \ C \# \) C \text{ œ } \&$
 $B \# \ \% B \ \% \ C \# \) C \ \text{ " " } \text{ œ } \& \ \% \ \text{ " " }$
 $B \ \# \ \# \ C \ \% \ \text{ œ } \# \&$

120. $B \# \ C \# \% B \text{ œ } \&$
 $B \# \% B \ C \# \text{ œ } \&$
 $B \# \% B \% C \# \text{ œ } \& \ \%$
 $B \ \# \ \# \ C \# \text{ œ } *$
 $G \ \# \ , \ ! \ , \ < \text{ œ } \$$



122. $B \# \ C \# \% B \ \# C \text{ œ } \%$
 $B \# \% B \% C \# \# C \ \text{ " } \text{ œ } \% \ \% \ \text{ " }$
 $B \ \# \ \# \ C \ \text{ " } \# \text{ œ } *$
 $G \ \# \ , \ \text{ " } \ , \ < \text{ œ } \$$

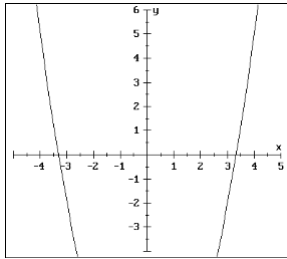


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123. Graph $C \propto B \# \text{''}$.

Find the B-intercepts.

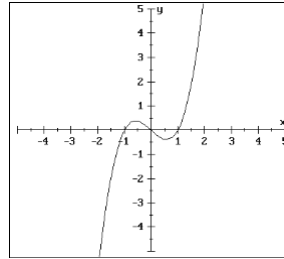
$B \propto \$ \text{p} \$ \#, B \propto \$ \text{p} \$ \#$



124. Graph $C \propto B \& B$.

Find the B-intercepts.

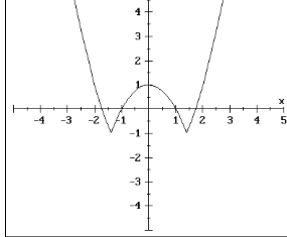
$B \propto \text{''}, B \propto \text{!}, B \propto \text{''}$



125. Graph $C \propto \text{,} B \# \# \text{, ''}$.

Find the B-intercepts.

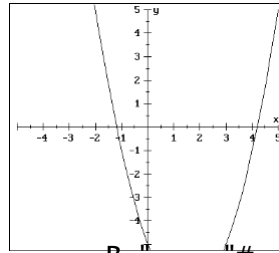
$B \propto \text{''}(\$, B \propto \text{''}, B \propto \text{''}, B \propto \text{''}(\$$



126. Graph $C \propto B \# \$ B \&$.

Find the B-intercepts.

$B \propto \text{''} \text{''}^*, B \propto \% \text{p} \text{''}^*$



127.

$$\frac{B}{\$} \propto \frac{B}{\text{''}}$$

$$\begin{aligned} \text{''!} & B \\ B B & \$ \propto \text{''!} B \text{''} \\ B \# & \$ B \propto \text{''!} B \text{''!} \\ B \# (B & \text{''!} \propto \text{!} \\ B \& B \# & \propto \text{!} \\ B \propto \& \text{ or } B \propto \# \end{aligned}$$

128.

$$\frac{B}{\text{''}} \propto \frac{\#}{\text{''}}$$

$$\begin{aligned} B \text{''} B \text{''} & \propto \# \text{''} \# \\ B \# \text{''} & \propto \# \% \\ B \# & \propto \# \& \\ B & \propto \text{,,} \& \end{aligned}$$

129. Let $B \propto$ the dosage needed.

$$\begin{aligned} \frac{\# \& \text{!}}{\text{''}} & \propto \frac{B}{\text{''}}, \\ \# \& \text{!} \text{''} & \propto \text{''} \text{''} \text{!} \text{''} B \\ \% \& \text{!} \text{!} & \propto \text{''} \text{''} \text{!} B \\ \% \& \text{!} & \propto B \end{aligned}$$

The dosage is 400 mg.

130. $0 \propto 5 = 0 \propto \frac{\$}{\text{''}} =$

$$\begin{aligned} \$ \propto 5 \& \\ \frac{\$}{\text{''}} & \propto 5 \\ \& & 0 \propto \frac{\$}{\text{''}} \\ & 0 \propto \text{pounds} \end{aligned}$$

CHAPTER 2 REVIEW

131. $v \propto 5@$
 30 mph 50 mph
 $v \propto 5 \$! \#$ $v \propto 5 \&! \#$
 $v \propto *!!5$ $v \propto \frac{\# \&!!5}{\# \&!!5} \# \&$
 Factor of increase $\propto \frac{\quad}{*!!5} \propto \frac{\quad}{*}$

132. $Z \propto \frac{5X}{5} \#!!$ $Z \propto \frac{!!}{5} X$
 $\%!! \propto \frac{T}{\# \&}$ $Z \propto \frac{T}{\#} \#!!$
 $!!!! \propto \$!!5$ $Z \propto \frac{!!}{\#}$
 $s \propto 5$ $Z \propto \$ \$ \$ "$ cms

133. $E \propto 56A$
 $E \propto "6A \hat{E} 5 \propto "$

134. $V \propto \frac{5P}{5^{\#}!!}$ $V \propto \frac{!!!!\&P}{!!!!\&P}$
 $\#!! \propto \frac{!!\& \#}{!!\& \#}$ $Z \propto \frac{!!}{!!} \#$
 $\#!! \propto \frac{!!5}{!!\&}$ $Z , "" (ohms$
 $!!!!\& \propto 5$

Chapter 2 Test (page 291)

1. $0 B \propto \frac{\$}{\#B \&}$
 domain $\propto \mathbb{C} \infty, \frac{\&}{\#} \cup \mathbb{C} \infty, \infty \square$

2. $0 B \propto \hat{E} B \$: \text{domain } \propto c \$, \infty$

3. $0 " \propto \frac{""}{\#} \propto \frac{""}{\#} \frac{""}{\#}$
 $0 \# \propto \frac{\#}{\#} \propto \frac{\#}{\#} \propto \#$

4. $0 " \propto \hat{E} " (\propto \hat{E} \cdot -$
 $0 \# \propto \hat{E} \# (\propto \hat{E}^* \propto \$$

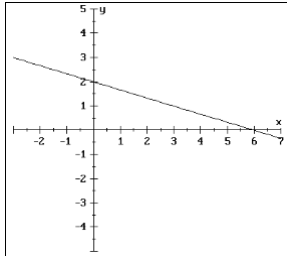
5. $\frac{0 B \ 2 \ 0 B}{2} \propto \frac{\square B \ 2 \ \# \ B \ 2 \ \&' \ cB\# \ B \ \&d}{cB\# \ \#B2 \ 2\# \ B \ 2 \ \&d \ cB\# \ B \ \&d}$
 $\propto \frac{B\# \ \#B2 \ 2\# \ B \ 2 \ \& \ B\# \ B \ \&}{\#B2 \ 2\# \ 2 \ \frac{2}{2} \ \#B \ 2 \ "}$
 $\propto \frac{\#B2 \ 2\# \ 2}{2} \propto \frac{\frac{2}{2} \ \#B \ 2 \ "}{2} \propto \#B \ 2 \ "$

6. $\$, 1 \hat{E} QII$

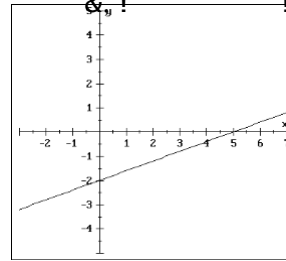
7. $!,) \hat{E} \text{ negative C-axis}$

CHAPTER 2 TEST

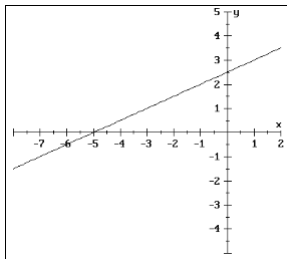
8. $B \text{ } \$C \text{ } \text{œ} \text{ } ' \quad B \text{ } \$C \text{ } \text{œ} \text{ } '$
 $B \text{ } \$! \text{ } \text{œ} \text{ } ' \quad ! \text{ } \$C \text{ } \text{œ} \text{ } '$
 $B \text{ } \text{œ} \text{ } ' \quad C \text{ } \text{œ} \text{ } \#$
 $' , ! \quad ! , \#$



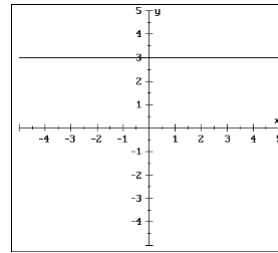
9. $\#B \text{ } \&C \text{ } \text{œ} \text{ } " ! \quad \#B \text{ } \&C \text{ } \text{œ} \text{ } " !$
 $\#B \text{ } \& ! \text{ } \text{œ} \text{ } " ! \quad \# ! \text{ } \&C \text{ } \text{œ} \text{ } " !$
 $B \text{ } \text{œ} \text{ } \& \quad C \text{ } \text{œ} \text{ } \#$
 $\& , ! \quad ! , \#$



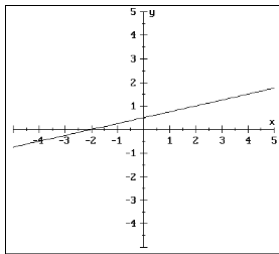
10. $\# B C \text{ } \text{œ} \text{ } \$ B \text{ } \&$
 $\#B \text{ } \#C \text{ } \text{œ} \text{ } \$ B \text{ } \&$
 $\#C \text{ } \text{œ} \text{ } B \text{ } \&$
 $C \text{ } \text{œ} \text{ } " B \text{ } \&$
- | | |
|---|----|
| B | C |
| ! | & |
| " | \$ |



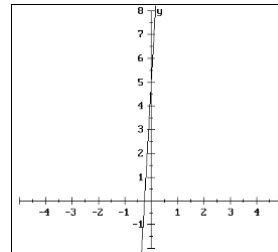
11. $\$B \text{ } \&C \text{ } \text{œ} \text{ } \$ B \text{ } \&$
 $\$B \text{ } \&C \text{ } \text{œ} \text{ } \$B \text{ } " \&$
 $\&C \text{ } \text{œ} \text{ } " \&$
 $C \text{ } \text{œ} \text{ } \$$
- | | |
|---|----|
| B | C |
| ! | \$ |
| # | \$ |



12. $\# B \text{ } \#C \text{ } \text{œ} \text{ } C \text{ } "$
 $" B \text{ } C \text{ } \text{œ} \text{ } C \text{ } "$
 $\#$
 $B \text{ } \#C \text{ } \text{œ} \text{ } \#C \text{ } \#$
 $\%C \text{ } \text{œ} \text{ } B \text{ } \#$
- | | |
|---|---|
| B | C |
| ! | # |
| # | " |



13. $B C \text{ } \&$
 $(\text{œ} \$B$
 $B \text{ } C \text{ } \& \text{œ} \#B$
 $C \text{ } \text{œ} \#B \text{ } \&$
- | | |
|---|---|
| B | C |
| ! | & |
| % | ! |



CHAPTER 2 TEST

14. $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
 $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
 $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
 $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
15. $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
 $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
 $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
 $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
16. $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
 $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
17. $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
 $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
18. $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
 $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
19. $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
 $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
20. $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
 neither
21. $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
 perpendicular
22. $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
23. $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
24. $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
25. $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
26. $\frac{B^2 - B^2}{C^2 - C^2} = \frac{B^2 - B^2}{C^2 - C^2}$
27. If the line is parallel to the C-axis, then it is a vertical line: $B = c$

C œ #B #

CHAPTER 2 TEST

CHAPTER 2 TEST

28. $C \propto B^5$ " " B
 $! \propto B^{\wedge} B^{\#}$ " " %
 $! \propto B B \% B \%$
 B-int: !, B-int: %, B-int: %
 B-int: !, !, %, !, %, !

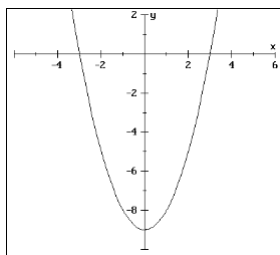
$C \propto B^5$ " " B
 $C \propto !^5$ " " !
 $C \propto !$
 C-int: !, !

29. $C \propto kB \%k$ $C \propto kB \%k$
 $! \propto kB \%k$ $C \propto k! \%k$
 $! \propto B \%$ $C \propto k \%k$
 $\% \propto B$ $C \propto \%$
 B-int: %, ! C-int: !, %

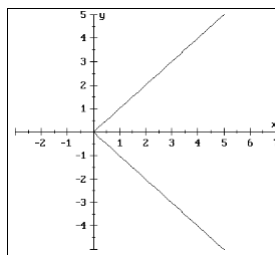
30. $C \propto B$ " " origin
 B-axis C-axis
 $C \propto B$ " $C \propto B$ " $C \propto B$ "
 $C \propto B$ " not equivalent: no symmetry $C \propto B$ "
 equivalent: symmetry not equivalent: no symmetry

31. $C \propto B\%$ " " origin
 B-axis C-axis
 $C \propto B\%$ " $C \propto B\%$ " $C \propto B\%$ "
 not equivalent: no symmetry $C \propto B\%$ " $C \propto B\%$ "
 equivalent: symmetry not equivalent: no symmetry

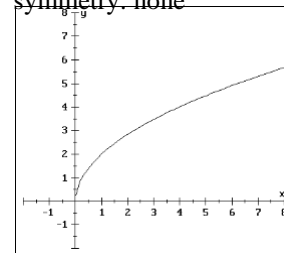
32. $C \propto B^{\#}$ *
 B-int: \$, !, \$, !
 C-int: !, *
 symmetry: C-axis



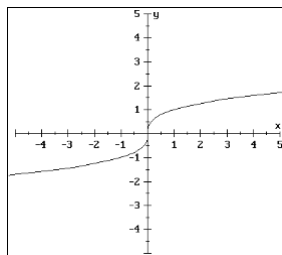
33. $B \propto kCk$
 B-int: !, !
 C-int: !, !
 symmetry: B-axis



34. $C \propto \#EB$
 B-int: !, !
 C-int: !, !
 symmetry: none



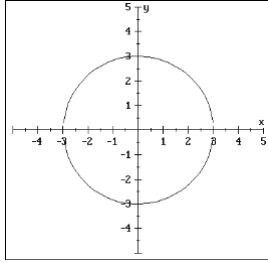
35. $B \propto Cs$
 B-int: !, !
 C-int: !, !
 symmetry: origin



CHAPTER 2 TEST

36. $G \& (; < \infty) \#$
 $B 2 \# C 5 \# \infty < \#$
 $B \& \# C (\# \infty \%$

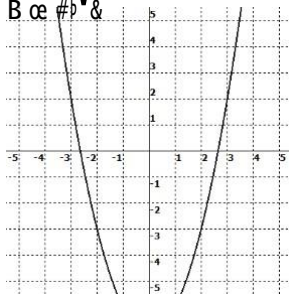
38. $B \# C \# \infty *$
 $G !, !, < \infty \$$



40. $C \infty 5D \#$

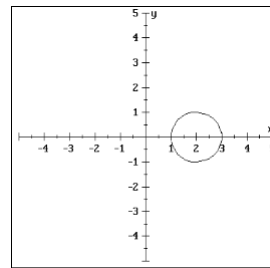
42. $T \infty 5U \quad T \infty \cup$
 $(\infty 5 \# \quad \#$
 $\cup \infty 5 \quad T \infty \cup \&$
 $\# \quad \# \&$
 $T \infty \#$

44. Graph $C \infty B \# (.$
 Find any positive B-intercept.
 $B \infty \# \&$



37. $< \infty \acute{E} \# ' \# \%) \#$
 $\infty \acute{E} \$ \#$
 $B 2 \# C 5 \# \infty < \#$
 $B \# \# C \% \# \infty \$ \#$

39. $B \# \% B C \# \$ \infty !$
 $B \# \% B C \# \infty \$$
 $B \# \% B \% C \# \infty \$ \%$
 $B \# \# C \# \infty "$
 $G \#, !, < \infty "$



41. $A \infty 5 < = \#$

43. $C \infty \frac{5B}{5}$ $C \infty \frac{\%B}{\$}$
 $D \#$ $D \#$
 $\dots \infty \frac{5 \$}{\# \#}$ $\# \infty \frac{\% B}{\$}$
 $\dots \infty$ $) \infty \frac{\% B}{\$}$
 $\%$
 $\frac{\%}{\$} \infty 5$ $\frac{\$}{\%} |) \infty \frac{\$}{\%} \cdot \frac{\%}{\$} B$
 $\#(\infty B$
 $\$ \#$

45. Graph $C \infty B \# \& B \&.$
 Find any plosive B-intercept.
 $B \infty \& \&$

