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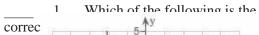
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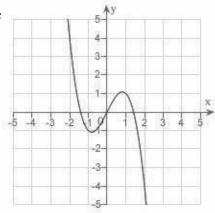
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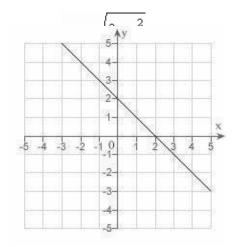
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Multiple Choice

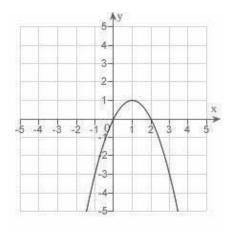
Identify the choice that best completes the statement or answers the question.

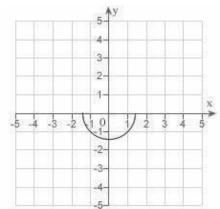






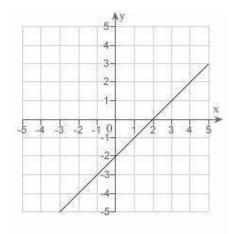
d.





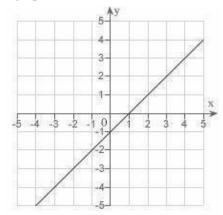
b.

e.

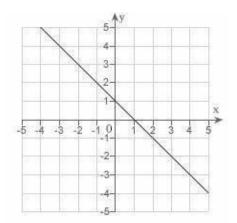


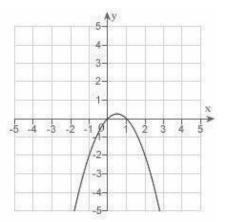
c.

Which of the following is the 2. correct graph of



$$y = x - x^3$$
?

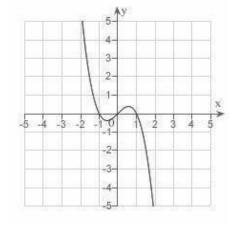




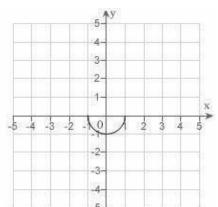
d.

a.

e.



b.



c.

Find all intercepts: 3.

$$y = x^2 - x - 12$$

- a. *x*-intercepts: (4,0), (¬,0); *y*-intercepts: (0,), (0, 3) b. *x*-intercept: (12, 0); *y*-intercepts: (0, 1, (0, 3) c. *x*-intercepts: (4, 0), (-3,0); *y*-intercept: (0, -12) d. *x*-intercepts: (1, 0), (1,0); *y*-intercepts: (0, -12), (0, 12) e. *x*-intercept: (1, 0); *y*-intercept: (0, -12)

Find all intercepts: 4.

$$y = (x+5)\sqrt{4-x^2}$$

- a. x-intercepts: (-5, 0), (-2, 0), (2, 0); y-intercepts: (0, 0), (0, 10)
- b. x-intercepts: (-5, 0), (2, 0); y-intercept: (0, 10)
- c. *x*-intercepts: (-5, 0), (2, 0); *y*-intercept: (0, -10)
- d. *x*-intercepts: (–5, 0), (–2, 0), (2, 0); *y*-intercept: (0, 10)
- e. x-intercepts: (-5, 0), (-2, 0), (2, 0); y-intercept: (0, -10)

Test for symmetry with respect to each axis and to the origin. 5.

$$x^2y^2=8$$

- a. symmetric with respect to the origin
- b. symmetric with respect to the *x*-axis
- c. symmetric with respect to the y-axis
- d. no symmetry
- e. A, B, and C

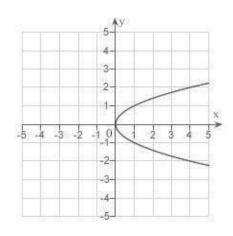
6. Test for symmetry with respect to each axis and to the origin.

$$y = \frac{x^2 + 2}{x}$$

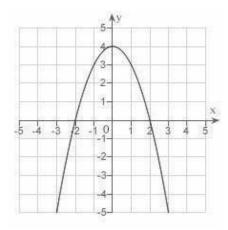
- a. symmetric with respect to the origin
- b. symmetric with respect to the y-axis
- c. symmetric with respect to the *x*-axis
- d. both B and C
- e. no symmetry

7. Sketch the graph of the equation:

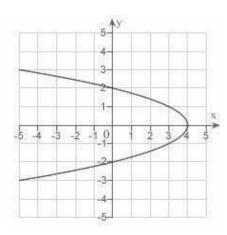
a.



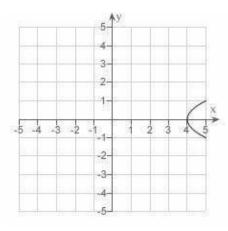
d.



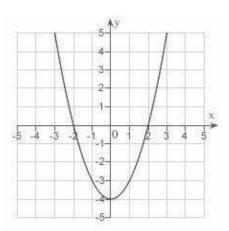
b.



e.



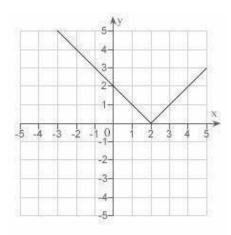
c.



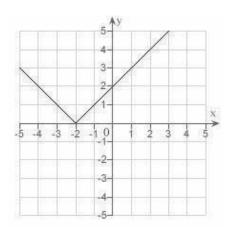
Sketch the graph of the equation: 8.

y = |x + 2|

a.



d.

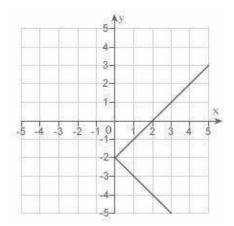


4--1.0 -2--3-

b.

e. none of the above

c.



9. Find the points of intersection of the graphs of the equations:

$$x = y^2 - 3$$

$$y = x + 1$$

a.
$$(-2, 1), (-1, 2)$$

b. $(-2, 0), (1, 2)$

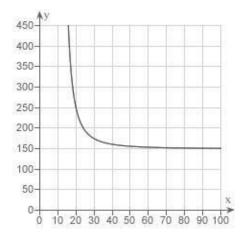
e.
$$(-2, -3), (-1, 2)$$

$$y = \frac{10,000}{x^2} - 0.57, 5 \le x \le 100,$$
 metal

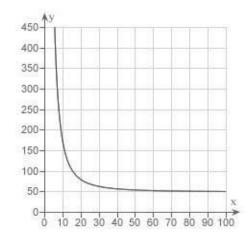
approximated by the model

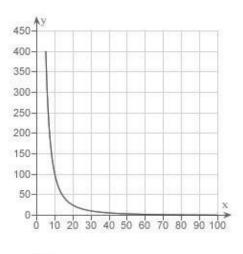
$$y = \frac{10,000}{x^2} - 0.57, 5 \le x \le 100.$$
 the

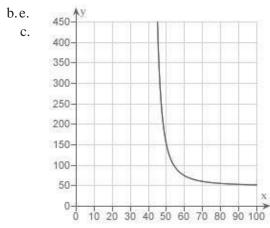
diameter of the wire in mils (0.001 in). Use a graphing utility to graph the model

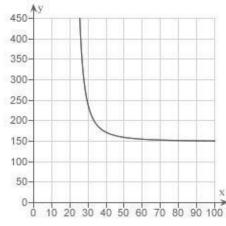












____11. The resistance y in ohms of 1000 feet of solid metal wire at 77°F can be approximated by the model

$$y = \frac{12,000}{x^2} - 0.46$$
, $5 \le x \le 100$, where x is the

diameter of the wire in

mils (0.001 in). If the diameter of the wire is doubled, the resistance is changed by approximately what factor? In determining your answer, you can ignore the constant -0.46.

 $\frac{1}{2}$ $\frac{1}{5}$ **4 5** $\frac{1}{4}$

a.

b.

c.

d.

e.

1

2

T

e

f

r

S

y

m

m

t

r

y

W

h

r

p

c

t

0

c

h

a

X

i

 \mathbf{S}

a

n

d

t O t h 0 r g i n

$$y = x^2 - 8$$

- symmetric with respect to the origin
- b. symmetric with respect to the y-axis
- c. symmetric with respect to the *x*-axis
- d. both B and C
- e. no symmetry

Test for symmetry with respect to each axis and to the origin. 13.

$$|y| - x = 6$$

- a. symmetric with respect to the origin
- b. symmetric with respect to the *x*-axis
- c. symmetric with respect to the y-axis
- d. no symmetry
- e. A, B, and C

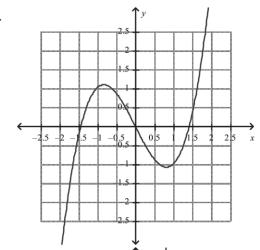
Find all intercepts: 14.

$$y^2 = x^3 - 25x$$

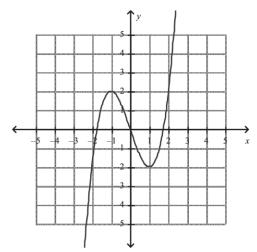
- a. *x*-intercepts: (0,0), (5,0), (-5,0); *y*-intercept: (0, -25)
- b. *x*-intercepts: (0,0), (5,0); *y*-intercept: (0, 0)
- c. *x*-intercepts: (0,0), (5,0), (-5,0); *y*-intercept: (0, 0)
- d. *x*-intercepts: (0,0), (5,0); *y*-intercept: (0, 5)
- e. x-intercepts: (0,0), (5,0), (25,0); y-intercept: (0,0)

Sketch the graph of the equation: 15.

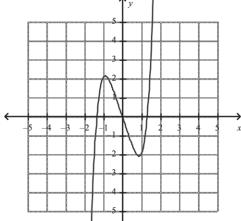
$$y = x^3 - 3x$$



d.

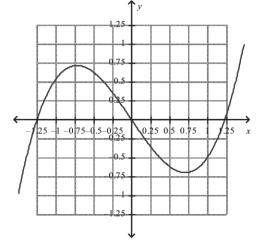


b.



e. none of the above

c.



P.1 Graphs and Models Answer Section

MULTIPLE CHOICE

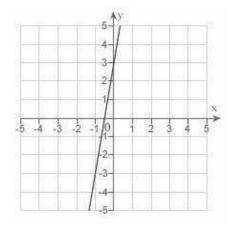
1. OBJ: 1	ANS: Identify the gra	B ph of a	PTS: semicircle	1	DIF:	Easy	REF: Section 0. MSC: Skill	1
2. OBJ: 1	ANS: Identify the gra	B ph of a	PTS: cubic equation	1	DIF:	Easy	REF: Section 0. MSC: Skill	1
3. OBJ:	ANS: Calculate the in	C	PTS: s of an equation	1	DIF:	Easy	REF: Section 0. MSC: Skill	1
4. OBJ:	ANS: Calculate the in	D atercepts	PTS: s of an equation	1	DIF:	Easy	REF: Section 0. MSC: Skill	1
5. OBJ: 1	ANS: Identify the typ	E e of syr	PTS:	1 raph of	DIF: an equation	Easy	REF: Section 0. MSC: Skill	1
6. OBJ: 1	ANS: Identify the typ	A e of syr	PTS: nmetry of the g	1 raph of	DIF: an equation	Easy	REF: Section 0. MSC: Skill	1
7. OBJ:	ANS: Graph a quadra	B tic equa	PTS: ation in y	1	DIF:	Easy	REF: Section 0. MSC: Skill	1
8. OBJ:	ANS: Graph an absol	D ute valu	PTS: ne equation	1	DIF:	Med	REF: Section 0. MSC: Skill	1
9. OBJ:	ANS: Calculate the po	C oints of	PTS: intersection of	1 the gra	DIF: phs of equation	Med as	REF: Section 0. MSC: Skill	1
10. OBJ: 1	ANS: Plot a rational r	B nodel u	PTS: sing the capabil	1 lities of	DIF: a graphing util	Med lity	REF: Section 0. MSC: Application	1
11. OBJ: 1	ANS: Interpret a ratio	E nal mod	PTS: del	1	DIF:	Med	REF: Section 0. MSC: Application	1
12. OBJ: 1	ANS:	B e of syr	PTS: mmetry of the g	1 raph of	DIF: an equation	Easy	REF: Section 0. MSC: Skill	1
13. OBJ: 1	ANS:	B e of syr	PTS: nmetry of the g	1 raph of	DIF: an equation	Easy	REF: Section 0. MSC: Skill	1
14. OBJ:	ANS: Calculate the in	C	PTS: s of an equation	1	DIF:	Easy	REF: Section 0. MSC: Skill	1
15. OBJ:	ANS: Graph an equat	D ion in y	PTS:	1	DIF:	Easy	REF: Section 0. MSC: Skill	1

P.2 Linear Models and Rates of Change

Multiple Choice

Identify the choice that best completes the statement or answers the question.

Estimate the slope of the line from the graph.



a. 3
$$-\frac{1}{3}$$

$$-\frac{1}{6}$$

$$\frac{1}{6}$$

b.

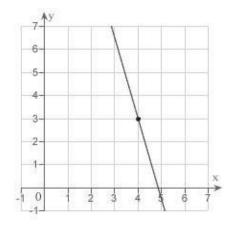
c.

d.

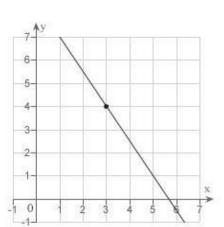
e. 6

the

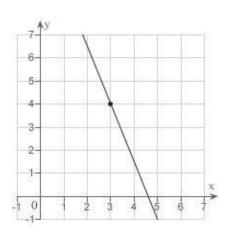
2. Sketch the line passing through $\overline{\text{point}}$ (3, 4) with the slope



$$-\frac{3}{2}$$
.

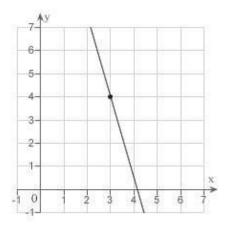


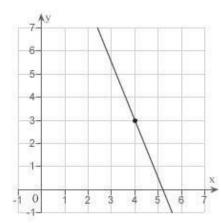
a.



d.

b. e. c.





3. Find the slope of the line passing through the pair of points.

- Find the slope of the line passing through the points $\left(-\frac{1}{8}, \frac{8}{3}\right)$ and $\left(-\frac{3}{16}, \frac{1}{24}\right)$
- 63 a.
- b. -21
- 42
- 21
- ⁻42
- If a line has slope m = -4 and passes through the point (4, 8), through which of the following points does the line also pass?
 - (1, 20)
 - (1, 12)
 - (1, 0)
 - (8, -16)
 - (8, -24)
- a.
- b.
- c.
- d.
- e.

- A moving conveyor is built to rise 5 meters for every 7 meters of horizontal change. Find the slope of the conveyor.
 - a. 0

- b.
- c.
- d.
- e.
- A moving conveyor is built to rise 1 meter for every 5 meters of horizontal change. Suppose the conveyor runs between two floors in a factory. Find the length of the conveyor if the vertical distance between floors is 10 meters. Round your answer to the nearest meter.
- 61 meters a.
- 39 meters b.
- 51 meters
- 50 meters
- e. 41 meters

Find the slope of the line x + 3y = 15. 8.

 $\frac{1}{3}$ $\frac{1}{5}$ $\frac{1}{5}$

b.

c.

d.

e.

Find the *y*-intercept of the line x + 4y = 8. 9.

(0, 2)

(0, 4)

(0, 8)

(4, 0)

(2, 0)

a.

b.

c.

d. e.

Find an equation of the line that passes through the point (7, 2) and has the slope m10. that is undefined.

$$y = 7$$

$$X = I$$

b.

$$\begin{aligned}
 x &= 2 \\
 y &= 7x
 \end{aligned}$$

e.

Find an equation of the line that passes through the point (-11, -9) and has the slope 11.

a.
$$y = \frac{9}{2}x - \frac{81}{2}$$

b. $y = \frac{9}{2}x + \frac{81}{2}$

b.
$$y = \frac{9}{2}x + \frac{81}{2}$$

c.
$$y = \frac{9}{2}x + 162$$

d. $y = \frac{9}{2}x$

d.
$$y = \frac{9}{2}x$$

e.
$$y = -\frac{9}{2}x$$

Find an equation of the line that passes through the points (18, -7) and (-18, 23). 12.

$$y = -\frac{5}{6}x - 8$$

b.
$$y = \frac{5}{6}x - 8$$

b.
$$y = \frac{5}{6}x - 8$$

c. d. $y = -\frac{5}{6}x + 8$

e.
$$y = -\frac{5}{6}x$$

$$\frac{13.}{\left(\frac{3}{2}, -\frac{21}{4}\right)}$$

Find an equation of the line that passes through the points

a.
$$y = \frac{1}{2}x$$

a.
$$y = \frac{1}{2}x$$

a.
$$y = \frac{1}{2}x$$

b. $y = \frac{1}{2}x + 6$

c.
$$y = \frac{1}{2}x + 12$$

c.
$$y = \frac{1}{2}x + 12$$

d. e. $y = \frac{1}{2}x - 6$

$$(a,0)$$
 and $(0,b)$
$$\frac{x}{a} + \frac{y}{b} = 1$$

 $a \neq 0$, $b \neq 0$ ", to write an equation of the line with x-intercept: (8,0) and y-intercept: (0,7).

a.
$$8x - 7y - 8 = 0$$

b.
$$7x - 8y + 7 = 0$$

c.
$$8x + 7y + 8 = 0$$

d.
$$7x + 8y + 56 = 0$$

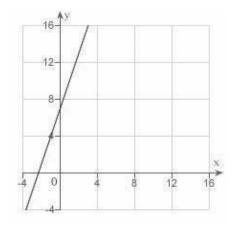
e.
$$7x + 8y - 56 = 0$$

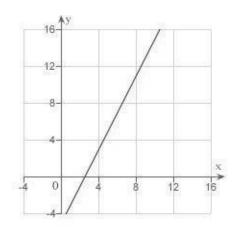
Use the result, "the line with intercepts 14.

has the equation

15. Sketch a graph of the equation

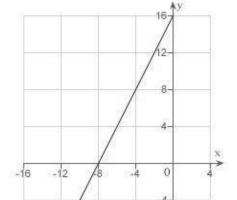
$$y - 8 = 2(x + 4)$$
.

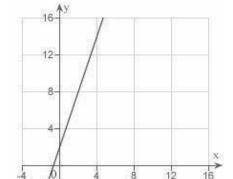




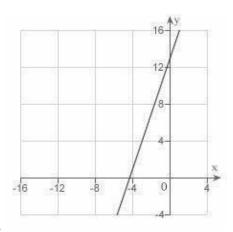
d.

e.





b.



c.

16. Write an equation of the line that passes through the given point and is perpendicular to the given line.

Point Line

$$\left(-1,-7\right)$$
 $x=6$

- a. y = 7
- b. y = -7
- c. y = -1
- d. x = -1
- e. x = 1

17. Write an equation of the line that passes through the given point and is parallel to the given line.

Point Line -2x - 5y = 9(3, -4)

- -2x 5y = 14
- b. -2x 5y = 23
- c. 2x 5y = 14
- d. -2x + 5y = -26
- e. 2x 5y = 23

Write an equation of the line that passes through the point $\left(-6,4\right)$ and is 18. perpendicular to the line x + y = 5.

- a. x-y+10=0
- b. x-y+2=0
- c. x+y-2=0
- d. x+y+10=0
- e. x+y-5=0

Write an equation of the line that passes through the point $\left(\frac{5}{4}, \frac{5}{8}\right)$ and is parallel to 19.



\$800 per month, all 50 occupied units drops to 47

a. $x = \frac{1}{15} (1595 - p)$

b.
$$x = \frac{1}{15} (1505 + p)$$

c.
$$x = \frac{1}{45} \left(1550 + p \right)$$

d.
$$x = \frac{1}{15} (1550 - p)$$

20. A real estate office handles an apartment complex with units. When the rent is units are occupied. However, when the rent is the average number of

. Assume that the relationship between the monthly rent and the

is linear. Write a linear equation giving the demand x in terms of the rent

21. A real estate office handles an apartment complex with units. When the rent is per month, \$600 all units are occupied. However, when the rent is \$, the average number of occupied units drops to $\frac{47}{8000}$. Assume that the relationship between the monthly rent $\frac{p}{8000}$ and the demand is linear. Predict the number of units occupied if the rent is raised to $\frac{8000}{1000}$.

- 43 units
- 54 units
- 57 units
- 49 units
- 46 units

22. Find the distance between the point
$$(-4,7)$$
 and line $x-y-2=0$ using the formula.

Distance =
$$\frac{\left|Ax_1 + By_1 + C\right|}{\sqrt{A^2 + B^2}}$$
 (x₁,y₁) and the line

$$Ax + By + C = 0$$

- a. $\frac{11\sqrt{2}}{2}$
- b. $\frac{4\sqrt{3}}{3}$
- c. $\frac{13\sqrt{2}}{2}$

for the distance between the point

- Suppose that the dollar value of a product in 2008 is \$174 and the rate at which the value of the product is expected to increase per year during the next \$ ears is \$ 7.5 Write a linear equation that gives the dollar value V of the product in terms of the year $t = t^2$ (Let $t = t^2$) Round the numerical values in your answer to one decimal place, where applicable.
- V = 7.5t 159
- b. V = -7.5t 114
- c. V = -7.5t + 174
- V = 7.5t + 114
- e. V = 7.5t 144

A company reimburses its sales representatives \$ 175 day for lodging and meals plus 24. 45ϕ per mile driven. Write a linear equation giving the daily cost to the company in terms of x, the number of miles driven. Round the numerical values in your answer to two decimal places, where applicable.

a.
$$C = -1.75x + 45$$

b.
$$C = 0.45x + 175$$

c.
$$C = -0.45x - 175$$

d.
$$C = 0.45x - 175$$

e. C = 1.75x - 45

- A company reimburses its sales representatives \$160 per day for lodging and meals plus 42¢ per mile driven. How much does it cost the company if a sales representative drives 135 miles on a given day? Round your answer to the nearest cent.
- a. 227.20
- b. 216.70
- c. 136.35
- d. 161.35
- e. 191.70

P.2 Linear Models and Rates of Change Answer Section

MULTIPLE CHOICE

1. OBJ:	ANS: Estimate the slo		PTS: line from its gr		DIF:	Easy F	REF: MSC:	
2. OBJ:	ANS: Sketch the line	D passing	PTS: through a poin	1 t with s		•	REF: MSC: S	Section 0.2 Skill
3. OBJ:	ANS: Calculate the sl			1 nrough		Easy F	REF: MSC:	Section 0.2 Skill
4. OBJ:	ANS: Calculate the sl		PTS: a line passing th	1 nrough	DIF: two points	Med	REF: MSC:	Section 0.2 Skill
5. OBJ:	ANS: Identify a point	A on a lin	PTS: ne with specifie	1 ed prope	DIF: erties	Med	REF: MSC:	
	ANS: Application	В	PTS:	1	DIF:	Easy F	REF:	Section 0.2
7. OBJ:	ANS: Calculate slope		PTS:	1	DIF:	Med	REF: MSC:	Section 0.2 Application
	ANS: Manipulate a li	E near equ		1 nine its	DIF: slope	Med	REF: MSC:	Section 0.2 Skill
9. OBJ:	ANS: Manipulate a li	A near equ	PTS: uation to determ	1 nine its	DIF: y-intercept	Med	REF: MSC:	Section 0.2 Skill
10. OBJ:	ANS: Write an equati	B on of a	PTS: line given a poi			•		Section 0.2
11. OBJ:	ANS: Write an equati	B on of a	PTS: line given a poi	1 int on tl	DIF: ne line and its s	2		Section 0.2
12. OBJ:	ANS: Write an equati	D on of a	PTS: line given two	1 points o	DIF: on the line	Easy F	REF: MSC:	Section 0.2 Skill
13. OBJ:	ANS: Write an equati	E on of a	PTS: line given two	1 points o	DIF: on the line	Med	REF: MSC:	Section 0.2 Skill
14. OBJ:	ANS: Write an equati	E on of a	PTS: line given its x	1 - and y-	DIF:	Easy F	REF: MSC:	

	ANS: Sketch the	B e graph o			on 1	DIF:	Med	REF: MSC: S	Section 0.2 Skill
	ANS: Write an e	_		ΓS: e given a	1 point on	DIF:		REF: nich it is MSC: S	Section 0.2
	ANS: Write an e	_	PTS: of a lin	1 e given a		Med the line	Section ne to wh		Skill
	ANS: Write an 6 : Skill	A equation	PTS: of a lin			Med the line	Section ne to wh		perpendicular
19. OBJ: Skill	ANS: Write an 6	A equation	PTS: of a lin	1 e given a		Easy R	Section ne to wh		parallel MSC:
20. OBJ:	ANS: Write line	E ear equat		TS: application	1 ons	DIF:	Med	REF: MSC:	Section 0.2 Application
21. OBJ:	ANS: Evaluate	E linear eq		ΓS: in applic	1 ations	DIF:	Easy F		Section 0.2 Application
22. OBJ:	ANS: Calculate	the dista		ΓS: ween a p	1 oint and	DIF: a line	Med	REF: MSC: S	Section 0.2
23. OBJ:	ANS: Write line	E ear equat		ΓS: applicatio	1 ons	DIF:	Easy F		Section 0.2 Application
24. OBJ:	ANS: Write line	B ear equat		ΓS: applicatio	1 ons	DIF:	Easy F		Section 0.2 Application
25. OBJ:	ANS: Evaluate	B linear eq		ΓS: in applic	1 ations	DIF:	Easy F		Section 0.2 Application

P.3 Functions and Their Graphs

Multiple Choice

Identify the choice that best completes the statement or answers the question.

Evaluate (if possible) the function f(x) = -6x - 5 at x = -2. Simplify the result. 1.

- **-7**
- b. 17
- 7
- e. undefined

Evaluate (if possible) the function $f(x) = \sqrt{x-5}$ at x = 9. Simplify the result. 2.

3 2 undefined

a.

b.

c. d.

e.

Evaluate (if possible) the function $g(x) = x^2(x+2)$ at x = t - 6. Simplify the result. 3.

 $t^3 - 4t^2 + 12t - 144$ $t^3 - 4t^2 + 84t - 144$

- a.
- b.
- c.
- d.

e. none of the above

Let
$$f(x) = 14x + 8$$
. Then simplify the expression $\frac{f(x) - f(9)}{x - 9}$.

15

14

19

11

b.

c. d.

e. undefined

Let
$$g(x) = \frac{1}{\sqrt{x+15}}$$
. Evaluate the expression $\frac{g(x) - g(-11)}{x+11}$ and then simplify the

result.

a.
$$2\sqrt{x+15} - x-15$$

 $2(x+11)(x+15)$

b.
$$\frac{2\sqrt{x+15}+x-15}{2(x-11)(x+15)}$$

c.
$$\frac{2\sqrt{x+15}+x-15}{2(x+11)(x+15)}$$

d.
$$\frac{2\sqrt{x+15}-x-15}{2(x-11)(x+15)}$$

e. undefined

Find the domain and range of the function $f(x) = x^2 - 6$. 6.

- a. domain:
 - range:
- b. domain:
 - range:
- c. domain: range:
- domain: range:
- domain: range:
 - Find the domain and range of the function $g(t) = \sqrt{t-10}$. 7.

- a. domain: range:
- b. domain: range:
- c. domain: range:
- d. domain: range:
- e. none of the above

8. Find the domain and range of the function
$$h(x) = \frac{11}{x+6}$$
.

- a. domain: $(-\infty, -6) \cup (-6, \infty)$ range: (-∞, ∞)
- b. domain: $(-\infty, -6) \cup (-6, \infty)$
 - range: $(-\infty, 0) \cup (0, \infty)$
- c. domain: (-∞, -6] ∪ [-6, ∞) range: $(-\infty, 0) \cup (0, \infty)$
- d. domain: (-∞, -6)
 - range: (0, ∞)
- e. domain: (-6, ∞) range: (0, ∞)

9. Evaluate the function
$$f(x) = \begin{cases} 2x + 1, & x < 0 \\ 2x + 2, & x \ge 0 \end{cases}$$
 at $f(5)$

$$f(5) = 6$$

$$f(5) = 5$$

$$f(5) = 13$$

$$f(5) = 11$$

$$f(5) = 12$$

- a.
- b.
- c.

d.

e.

10. Determine the domain and range of the function
$$f(x) = \begin{cases} 3x + 2, & x < 0 \\ 3x + 6, & x \ge 0 \end{cases}$$

a. domain: (-∞, 2) range: (-∞, 2) ∩ [6, ∞]

b. domain: (**-∞**, ∞)

range: (-∞, 2) ∪ [6, ∞)

c. domain: (-∞, ∞) range: (-∞, 2) ∪ (∞, 6]

d. domain: (-∞, ∞) range: $(\infty, 2) \cup (6, -\infty)$

e. domain: (-∞, 3) range: $(-\infty, 2) \cap [6, \infty)$

____ 11. Determine whether y is a function of x.

$$y - 5x^2 = 6$$

a. no

b. yes

Determine whether y is a function of x. 12.

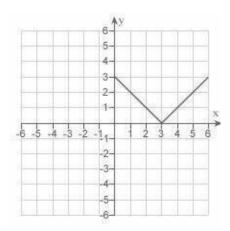
$$xy - x^2 = 3y + x$$

a. no

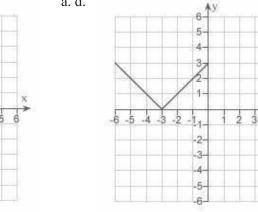
b. yes

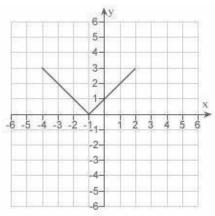
Use the graph of y = f(x)13.

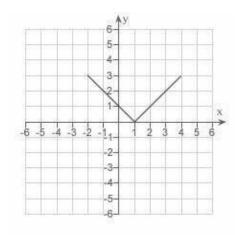
given below to find the graph of the function y = f(x+5)



a. d.

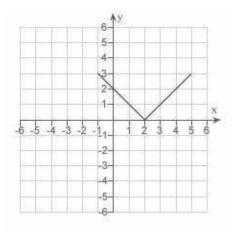




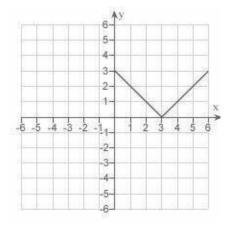


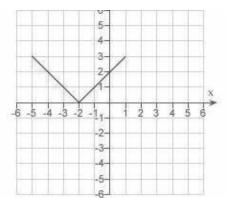
b.

e.

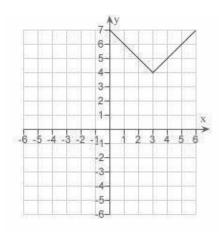


Use the graph of y = f(x)14.



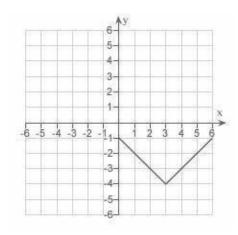


given below to find the graph of the function y = f(x) + 4.

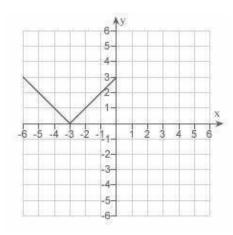


a. d.

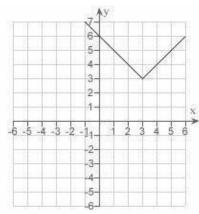
e.

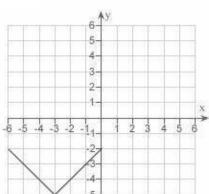


b.









_ 15. Given
$$f(x) = \cos x$$
 and $g(x) = \frac{\pi}{2}x$, evaluate $f(g(2))$.

0 $\frac{1}{2}$ $\frac{\pi}{2}\sin(2)$ -1 $\frac{\pi}{2}\cos(2)$

a.

b.

c.

d.

e.

Determine whether the function is even, odd, or neither. 16.

$$f(x) = x^2(3-x)^2$$

- a. odd
- even
- c. neither

17. Determine whether the function is even, odd, or neither.

$$f(x) = x \sin 2x$$

- even
- odd b.
- neither

Find the coordinates of a second point on the graph of a function f if the given point $\left[-\frac{6}{5}, 8\right]$ is on the graph and the function is even.

- a. $\left(8, -\frac{6}{5}\right)$
- b. $\left(-8, -\frac{6}{5}\right)$ c. $\left(-\frac{6}{5}, -8\right)$ d. $\left(\frac{6}{5}, -8\right)$ e. $\left(\frac{6}{5}, 8\right)$

- - Find the coordinates of a second point on the graph of a function f if the given point 19.

 $\left(-\frac{9}{8}, 5\right)$ is on the graph and the function is odd.

a.
$$\left(-5, -\frac{9}{8}\right)$$

b.
$$\left(\frac{9}{8}, -5\right)$$

c.
$$\left(-5, \frac{9}{8}\right)$$

d.
$$\left(-\frac{9}{8}, -5\right)$$

e.
$$\left(\frac{9}{8}, 5\right)$$

20. The horsepower H required to every energy wind drag on a certain automobile is approximated by where x is the speed of the car in miles per hour. Find $H\left(\frac{x}{1.1}\right)$. Round the numerical values in your answer to five decimal places.

a.
$$H\left(\frac{x}{1.1}\right) = 0.00150x^2 + 0.00455x - 0.02700$$

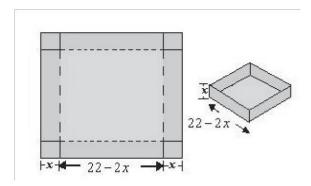
b.
$$H\left(\frac{x}{1.1}\right) = 0.00150x^2 + 0.00165x - 0.00455$$

c.
$$H\left(\frac{x}{1.1}\right) = 0.00165x^2 + 0.00150x - 0.02700$$

d.
$$H\left(\frac{x}{1.1}\right) = 0.00165x^2 + 0.00455x - 0.02700$$

e.
$$H\left(\frac{x}{1.1}\right) = 0.00455x^2 + 0.00165x - 0.02700$$

21. An open box of maximum volume is to be made from a square piece of material 22 centimeters on a side by cutting equal squares from the corners and turning up the sides (see figure). Write the volume V as a function of x, the length of the corner squares.



a.
$$V = x(22 - 2x)^2$$

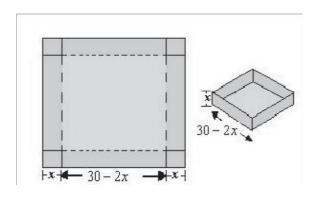
b.
$$V = x + (22 - x)^2$$

c.
$$V = x^2 + (22 - 2x)$$

d.
$$V = x^2(22 - 2x)$$

e.
$$V = x(22 - 2x)$$

An open box of maximum volume is to be made from a square piece of material 30 22. centimeters on a side by cutting equal squares from the corners and turning up the sides(see figure). What is the domain of the function $V = x(30 - 2x)^2$.



a. domain: **0 < x < ∞**

b. domain: 30

c. domain: 0 < x < 15d. domain: 0 < x < 30

e. domain: 15

P.3 Functions and Their Graphs Answer Section

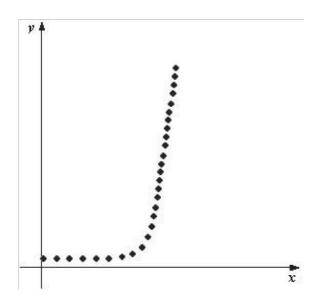
1. ANS: OBJ: Evaluate a fun	D ction an	PTS: ad simplify	1	DIF:	Easy	REF: Section 0.3 MSC: Skill
2. ANS: OBJ: Evaluate a fun	B ction an	PTS:	1	DIF:	Easy	REF: Section 0.3 MSC: Skill
3. ANS: OBJ: Evaluate a fun	C ction an	PTS: ad simplify	1	DIF:	Easy	REF: Section 0.3 MSC: Skill
4. ANS: OBJ: Simplify a diff	B	PTS: quotient	1	DIF:	Med	REF: Section 0.3 MSC: Skill
5. ANS: OBJ: Simplify a diff	A Terence	PTS: quotient	1	DIF:	Med	REF: Section 0.3 MSC: Skill
6. ANS: OBJ: Identify the do	E main ar	PTS: nd range of a fu	1 nction	DIF:	Easy	REF: Section 0.3 MSC: Skill
7. ANS: OBJ: Identify the do	E main ar	PTS: nd range of a fu	1 nction	DIF:	Easy	REF: Section 0.3 MSC: Skill
8. ANS: OBJ: Identify the do	B main ar	PTS: nd range of a fu	1 nction	DIF:	Easy	REF: Section 0.3 MSC: Skill
9. ANS: OBJ: Evaluate a piec	E cewise f	PTS: Function	1	DIF:	Easy	REF: Section 0.3 MSC: Skill
10. ANS: OBJ: Identify the do	B main ar	PTS: and range of a fu	1 nction	DIF:	Easy	REF: Section 0.3 MSC: Skill
11. ANS: OBJ: Identify equati	B ons that	PTS: are functions	1	DIF:	Easy	REF: Section 0.3 MSC: Skill
12. ANS: OBJ: Identify equati	B ons that	PTS: are functions	1	DIF:	Easy	REF: Section 0.3 MSC: Skill
13. ANS: OBJ: Graph transfor	E mations	PTS:	1	DIF:	Easy	REF: Section 0.3 MSC: Skill
14. ANS: OBJ: Graph transfor	A mations	PTS: s of functions	1	DIF:	Med	REF: Section 0.3 MSC: Skill
15. ANS: OBJ: Evaluate comp	D osite fu	PTS:	1	DIF:	Easy	REF: Section 0.3 MSC: Skill
16. ANS:	C	PTS:	1	DIF:	Easy	REF: Section 0.3

OBJ:	Identify the type	pe of sy	mmetry of the	graph c	of a function		MSC: Skill
17. OBJ:	ANS: Identify the type	A pe of sy	PTS:	1 graph c	DIF: of a function	Easy	REF: Section 0.3 MSC: Skill
18. OBJ:	ANS: Identify points	E on a gr	PTS:	1 metry	DIF:	Easy	REF: Section 0.3 MSC: Skill
19. OBJ:	ANS: Identify points	B on a gr	PTS:	1 metry	DIF:	Easy	REF: Section 0.3 MSC: Skill
20. OBJ:	ANS: Apply compos	D ite func	PTS:	1	DIF:	Med	REF: Section 0.3 MSC: Application
21. OBJ:	ANS: Create function	A ns in ap	PTS: plications	1	DIF:	Med	REF: Section 0.3 MSC: Application
	ANS: Identify domai Fitting Mode	•		1	DIF:	Med	REF: Section 0.3 MSC: Application

Multiple Choice

Identify the choice that best completes the statement or answers the question.

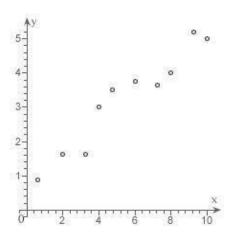
Determine which type of function would be most appropriate to fit the given data.



- exponential
- b. linear
- c. quadratic

- d. no relationship
- e. trigonometric

2. Which function below would be most appropriate model for the given data?



- no apparent relationship between x and y
- b. trigonometric
- quadratic
- d. linear

Hooke's Law states that the force F required to compress or stretch a spring (within its elastic limits) is proportional to the distance d that the spring is compressed or stretched from its original length. That is, F = kd where k is a measure of the stiffness of the spring and is called the spring constant. The table shows the elongation d in centimeters of a spring when a force of Fnewtons is applied. Use the regression capabilities of a graphing utility to find a linear model for the data. Round the numerical values in your answer to three decimal places.

F	20	40	60	80	100
d	1.9	3.8	5.7	7.6	9.5

d = 0.675F

d.
$$d = 0.095F$$

e.
$$d = 0.905F$$

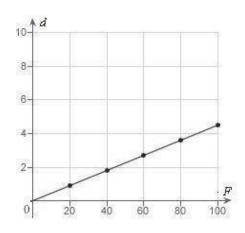
d = 0.118F

d = 0.112F

Hooke's Law states that the force F required to compress or stretch a spring (within 4. its elastic limits) is proportional to the distance d that the spring is compressed or stretched from its original length. That is, F = kd where k is a measure of the stiffness of the spring and is called the spring constant. The table shows the elongation d in centimeters of a spring when a force of Fnewtons is applied. Use a graphing utility to plot the data and graph the linear model.

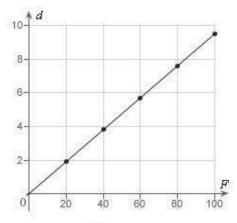
F	20	40	60	80	100
d	1.3	2.6	3.9	5.2	6.5

a.

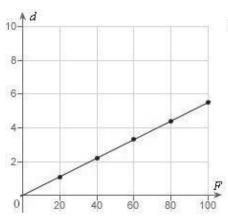


d.

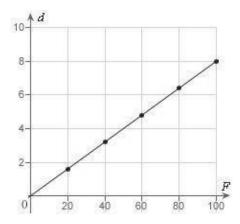
b.



e.



10 Å d 8-6-4-2-0



5. Hooke's Law states that the force F required to compress or stretch a spring (within its elastic limits) is proportional to the distance d that the spring is compressed or stretched from its original length. That is, $\sqrt[p]{w}$ where k is a measure of the stiffness of the spring and is called the spring constant. The table shows the elongation d in centimeters of a spring when a force of F newtons is applied. Use the model to estimate the elongation of the spring when a force of 55 newtons is applied. Round your answer to two decimal places.

F	20	40	60	80	100
d	1.7	3.4	5.1	6.8	8.5

- 8.08 cm a.
- b. 6.38 cm
- c. 4.68 cm
- d. 2.98 cm
- e. 9.78 cm

In an experiment, students measured the speed s (in meters per second) of a falling 6. object t seconds after it was released. The results are shown in the table below. Use the regression capabilities of a graphing utility to find a linear model for the data. Round all numerical values in your answer to one decimal place.

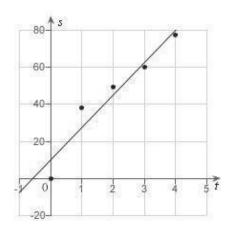
t	0	1	2	3	4
2	0	13.0	21.4	31.2	41.4

- a. s = 10.1t + 1.2
- b. s = 3.0t 1.2
- c. s = 1.2t + 10.1
- d. s = 10.1t + 3.0
- e. s = 1.2t 3.0
- In an experiment, students measured the speed s (in meters per second) of a falling 7. object t seconds after it was released. The results are shown in the table below. Use the regression capabilities of a graphing utility to find a linear model for the data. Round all numerical values in your answer to one decimal place.

t	0	1	2	3	4
2	0	40	48.4	58.2	68.4

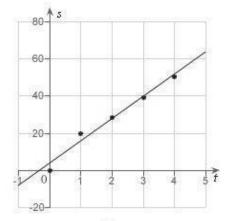
a.

d.

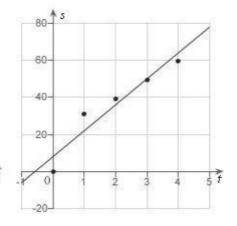


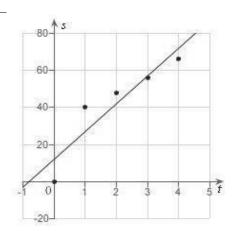
b.

e.



60-40-20-5 t





8. In an experiment, students measured the speed s (in meters per second) of a falling s = 11.9t + 4.8 to estimate the speed of the object after decimal places.

0 1 2 3 4 22.0 30.4 40.2 50.4

object t seconds after it was released. The results are shown in the table below. Use the model 1.5 seconds. Round your answer to two

- 21.05 meters/second
- 20.95 meters/second
- c. 24.25 meters/second
- d. 23.55 meters/second
- e. 22.65 meters/second

Students in a lab measured the breaking strength S (in pounds) of wood 2 inches thick, x inches high, and 12 inches long. The results are shown in the table below. Use the regression capabilities of a graphing utility to fit a quadratic model to the data. Round the numerical values in your answer to two decimal places, where applicable.

х	4	б	8	10	12
S	2422	5512	10, 362	16,302	23, 912

$S = 170.89x^2 - 209.79x + 324$
$S = 180.89x^2 - 205.79x + 324$
$S = 190.89x^2 + 201.79x + 331$
$S = 170.89x^2 - 209.79x + 327$
$S = 180.89x^2 + 203.79x - 331$

a.

b.

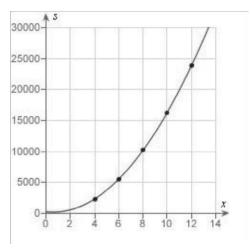
c.

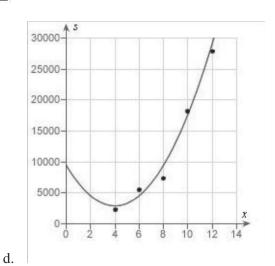
d.

e.

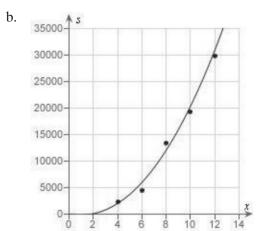
10. Students in a lab measured the breaking strength S (in pounds) of wood 2 inches thick, x inches high, and 12 inches long. The results are shown in the table below. Use a graphing utility to plot the data and graph the quadratic model.

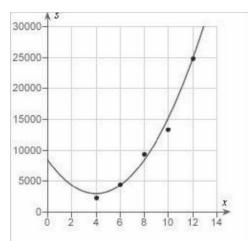
х	4	б	8	10	12
ន	2370	4460	13,310	19, 250	29,860



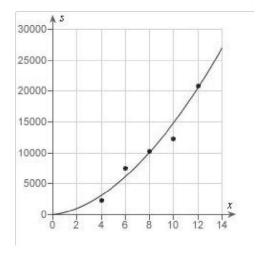


a.





e.



Students in a lab measured the breaking strength S (in pounds) of wood 2 inches thick, x inches high, and 12 inches long. The results are shown in the table below. Use the model $S = 180.89x^2 - 205.79x + 284$ to approximate the breaking strength when x = 2. Round your answer to two decimal places.

х	4	6	8	10	12
ಭ	2382	5472	10, 322	16, 262	23, 872

- 595.98 pounds
- 390.19 pounds
- 957.76 pounds
- d. 801.77 pounds
- e. 751.97 pounds

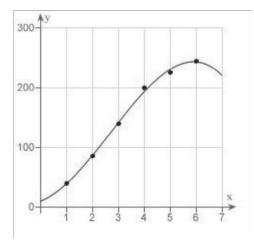
A V8 car engine is coupled to a dynamometer and the horsepower y is measured at different engine speeds x (in thousands of revolutions per minute). The results are shown in the table below. Use the regression capabilities of a graphing utility to find a cubic model for the data. Round the numerical values in your answer to three decimal places, where applicable.

х	1	2	3	4	5	6
У	64	109	164	224	249	269

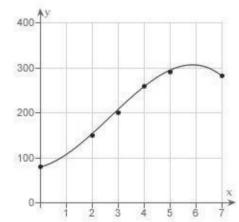
- a. $y = -1.608x^3 14.583x^2 + 13.389x 37$
- b. $y = -1.706x^3 14.583x^2 16.389x + 34$
- c. $y = 1.806x^3 + 11.583x^2 + 16.389x 41$
- d. $y = -1.806x^3 + 14.583x^2 + 16.389x + 34$
- e. $y = 1.608x^3 + 11.583x^2 19.389x + 41$

13. A V8 car engine is coupled to a dynamometer and the horsepower y is measured at different engine speeds x (in thousands of revolutions per minute). The results are shown in the table below. Use a graphing utility to plot the data and graph the cubic model.

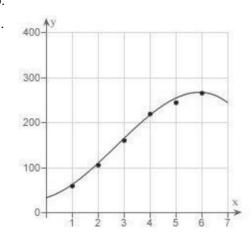
х	1	2 3		4	5	б	
у	110	155	210	270	295	315	

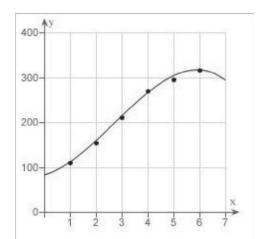


a.

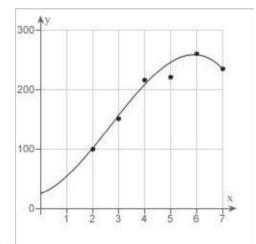


b.





d.



e.

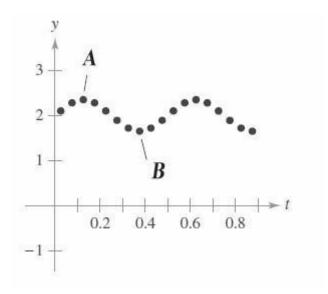
14. A V8 car engine is coupled to a dynamometer and the horsepower y is measured at different engine speeds x (in thousands of revolutions per minute). The results are shown in the table $y = -1.806x^2 + 14.58x^2 + 16.4x + 30$

below. Use the model to approximate the horsepower when the engine is running at 5500 revolutions per minute. Round your answer to two decimal places.

x	1	2	3	4	5	6	
У	60	105	160	220	245	265	

- 260.77 hp
- 262.73 hp
- c. 262.36 hp
- 261.38 hp
- e. 261.91 hp

The motion of an oscillating weight suspended by a spring was measured by a motion 15. detector. The data collected and the approximate maximum (positive and negative) displacements from equilibrium are shown in the figure. The displacement is measured in centimeters, and the time is measured in seconds. Take A(0.133,2.49) and B(0.343,1.78). Approximate the amplitude and period of the oscillations.



- Amplitude = 0.335. Period = 4.3.
- b. Amplitude = 0.71. Period = 2.1.

- c. Amplitude = 0.355. Period = 4.2.
- d. Amplitude = 4.2. Period = 0.355.
- e. Amplitude = 2.1. Period = 0.71.

P.4 Fitting Models to Data Answer Section

MULTIPLE CHOICE

1.	ANS:	A	PTS:	1	DIF:	Easy	REF: Section 0.4
OBJ	: Identify the	most app	propriate fur	ection for a	scatter plot		MSC: Skill
2.	ANS:	D	PTS:	1	DIF:	Easy	REF: Section 0.4
OBJ	: Identify the	most app	propriate fur	ection for a	scatter plot		MSC: Skill
3.	ANS:	D	PTS:	1	DIF:	Easy	REF: Section 0.4
	: Write a line lication	ar model	for data usin	ng the regr	ession capal	bilities of a graph	ning utility MSC:
4.	ANS:	D	PTS:	1	DIF:	Easy	REF: Section 0.4
OBJ	: Plot data po	oints and t	the graph of	a linear m	odel		MSC: Application
5.	ANS:	C	PTS:	1	DIF:	Easy	REF: Section 0.4
OBJ	: Evaluate lir	near mode	els in applica	ations			MSC: Application
6.	ANS:	A	PTS:	1	DIF:	Easy	REF: Section 0.4
	: Write a line lication	ar model	for data usin	ng the regr	ression capal	bilities of a graph	ning utility MSC:
7.	ANS:	C	PTS:	1	DIF:	Easy	REF: Section 0.4
OBJ	: Plot data po	oints and t	the graph of	a linear m	odel		MSC: Application
8.	ANS:	E	PTS:	1	DIF:	Easy	REF: Section 0.4
OBJ	: Evaluate lin	near mode	els in applica	ations			MSC: Application
9.	ANS:	В	PTS:	1	DIF:	Med	REF: Section 0.4
	: Write a qua lication	dratic mo	del for data	using the	regression c	apabilities of a gr	raphing utility MSC:
10.	ANS:	В	PTS:	1	DIF:	Med	REF: Section 0.4
OBJ	: Plot data po	oints and t	the graph of	a quadrati	c model		MSC: Application
11.	ANS:	A	PTS:	1	DIF:	Med	REF: Section 0.4
OBJ	: Evaluate qu	adratic m	nodels in app	plications			MSC: Application
12.	ANS:	D	PTS:	1	DIF:	Med	REF: Section 0.4
OBJ	: Evaluate cu	bic mode	ls in applica	ntions			MSC: Application

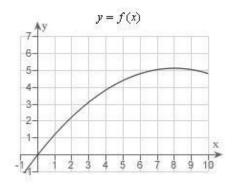
13. OBJ:	ANS: Plot data points	D and the	PTS: e graph of a cul	1 pic mod	DIF: lel	Med	REF: MSC: A	Section 0.4 application			
	ANS: Write a cubic m cation	A nodel fo	PTS: r data using the	1 e regres	DIF: sion capabilitie	Med s of a graphing	REF: gutility M	Section 0.4			
15. OBJ:	ANS: Fit a trigonome	C tric mod	PTS: del to a real-life	1 e data s	DIF: et.	Easy 1.1 A		Section 0.4 application of Calculus 43			
1.1 A	Preview of	Calcu	lus								
	Multiple Choice Identify the choice that best completes the statement or answers the question.										
1. Decide whether the following problem can be solved using precalculus, or whether calculus is required. If the problem can be solved using precalculus, solve it. If the problem seems to require calculus, use a graphical or numerical approach to estimate the solution.											
Find t	he distance trav	eled in	16 seconds by	an obje	ct traveling at a	a constant velo	city of 20	feet per second.			
 a. calculus, 320 ft b. calculus, 340 ft c. precalculus, 320 ft d. calculus, 640 ft e. precalculus, 640 ft 											
2. Decide whether the following problem can be solved using precalculus, or whether calculus is required. If the problem can be solved using precalculus, solve it. If the problem seems to require calculus, use a graphical or numerical approach to estimate the solution.											
	Find the distance traveled in 20 seconds by an object moving with a velocity of $v(t) = 8 + 6\cos t$ feet per second.										
a. c	alculus, 162.448	35 ft									

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- b. precalculus, 163.7985 ft
- c. calculus, 165.4777 ft
- d. precalculus, 165.4777 ft
- e. precalculus, 162.4485 ft

_____ 3. Decide whether the following problem can be solved using precalculus, or whether calculus is required. If the problem can be solved using precalculus, solve it. If the problem seems to require calculus, use a graphical or numerical approach to estimate the solution.

A cyclist is riding on a path whose elevation is modeled by the function $f(x) = 0.08 \left(16x - x^2\right)$ where x and f(x) are measured in miles. Find the rate of change of elevation when x = 4.

44 Chapter 1: Limits and Their Properties



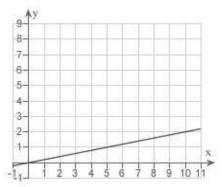
- a. precalculus, 0.08
- b. calculus, 0.2
- c. calculus, 0.64
- d. calculus, 0.08
- e. precalculus, 0.2

4. Decide whether the following problem can be solved using precalculus, or whether calculus is required. If the problem can be solved using precalculus, solve it. If the problem seems to require calculus, use a graphical or numerical approach to estimate the solution.

$$f(x) = 0.2x$$

f(x) are measured in miles. Find the rate of change of elevation when x = 5.

$$y = f(x)$$

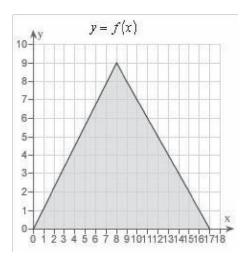


- b. precalculus, 0.2
- c. calculus, 0.2
- d. precalculus, 2
- e. precalculus, 0.45

1.1 A Preview of Calculus 45

5. Decide whether the following problem can be solved using precalculus, or whether calculus is required. If the problem can be solved using precalculus, solve it. If the problem seems to require calculus, use a graphical or numerical approach to estimate the solution.

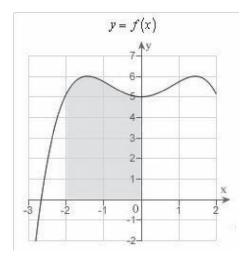
Find the area of the shaded region bounded by the triangle with vertices (0,0), (8,9), (17,0).



- a. precalculus, 153
- b. calculus, 229.5
- c. precalculus, 76.5
- d. precalculus, 229.5
- e. calculus, 153

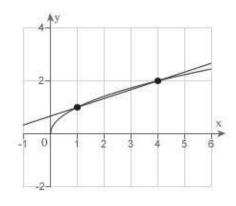
_____ 6. Decide whether the following problem can be solved using precalculus, or whether calculus is required. If the problem can be solved using precalculus, solve it. If the problem seems to require calculus, use a graphical or numerical approach to estimate the solution.

Find the area of the shaded region.

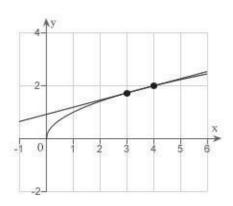


- a. calculus, 11
- b. precalculus, 11
- c. precalculus, 13
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- d. calculus, 16
- e. precalculus, 16
- 7. Consider the function $f(x) = \sqrt{x}$ and the point P(4,2) on the graph of f. Graph f and the secant line passing through P(4,2) and Q(x,f(x)) for x=3.

a.



d.



b. e.

