

**Mid-Chapter Quiz: Lessons 5-1 through 5-4**

**Simplify. Assume that no variable equals 0.**

1.  $(3x^2y^{-3})(-2x^3y^5)$

ANSWER:

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

2.  $4t(3rt - r)$

ANSWER:

$$12rt^2 - 4rt$$

3.  $\frac{3a^4b^3c}{6a^2b^5c^3}$

ANSWER:

$$\frac{a^2}{2b^2c^2}$$

4.  $\left(\frac{p^2r^3}{pr^4}\right)^2$

ANSWER:

$$\frac{p^2}{r^2}$$

5.  $(4m^2 - 6m + 5) - (6m^2 + 3m - 1)$

ANSWER:

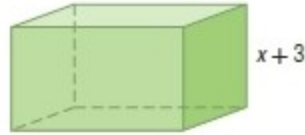
$$-2m^2 - 9m + 6$$

6.  $(x + y)(x^2 + 2xy - y^2)$

ANSWER:

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

7. **MULTIPLE CHOICE** The volume of the rectangular prism is  $6x^3 + 19x^2 + 2x - 3$ . Which polynomial expression represents the area of the base?



A  $6x^4 + 37x^3 + 59x^2 + 3x - 9$

B  $6x^2 + x + 1$

C  $6x^2 + x - 1$

D  $6x + 1$

ANSWER:

C

**Simplify.**

8.  $(4r^3 - 8r^2 - 13r + 20) \div (2r - 5)$

ANSWER:

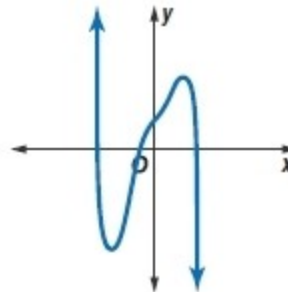
$$2r^2 + r - 4$$

9.  $\frac{3x^3 - 16x^2 + 9x - 24}{x - 5}$

ANSWER:

$$3x^2 - x + 4 - \frac{4}{x - 5}$$

10. Describe the end behavior of the graph. Then determine whether it represents an odd-degree or an even-degree polynomial function and state the number of real zeros.



ANSWER:

end behavior:

$f(x) \rightarrow \infty$  as  $x \rightarrow -\infty$  and  $f(x) \rightarrow -\infty$  as  $x \rightarrow \infty$ ;  
odd degree function; 3 real zeros

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11. **MULTIPLE CHOICE** Find  $p(-3)$  if

$$p(x) = \frac{2}{3}x^3 + \frac{1}{3}x^2 - 5x.$$

- F 0  
G 11  
H 30  
J 36

**ANSWER:**

F

12. **PENDULUMS** The formula  $L(t) = \frac{8t^2}{\pi^2}$  can be used

to find the length of a pendulum in feet when it swings back and forth in  $t$  seconds. Find the length of a pendulum that makes one complete swing in 4 seconds.

**ANSWER:**

about 12.97 ft

13. **MULTIPLE CHOICE** Find  $3f(a-4) - 2h(a)$  if

$$f(x) = x^2 + 3x \text{ and } h(x) = 2x^2 - 3x + 5.$$

- A  $-a^2 + 15a - 74$   
B  $-a^2 - 2a - 1$   
C  $a^2 + 9a - 2$   
D  $-a^2 - 9a + 2$

**ANSWER:**

D

14. **ENERGY** The power generated by a windmill is a function of the speed of the wind. The approximate

power is given by the function  $P(s) = \frac{s^3}{1000}$ , where

$s$  represents the speed of the wind in kilometers per hour. Find the units of power  $P(s)$  generated by a windmill when the wind speed is 18 kilometers per hour.

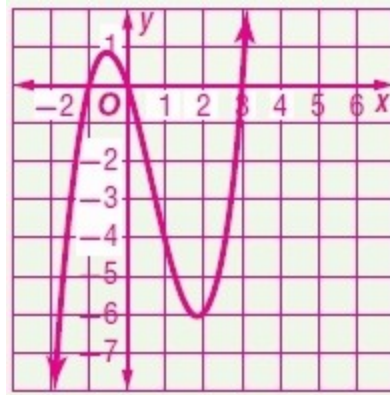
**ANSWER:**

5.832 units

Use  $f(x) = x^3 - 2x^2 - 3x$  for Exercises 15–17.

15. Graph the function.

**ANSWER:**



16. Estimate the  $x$ -coordinates at which the relative maxima and relative minima occur.

**ANSWER:**

$x = -0.5$  and  $2$

17. State the domain and range of the function.

**ANSWER:**

$D = \{\text{all real numbers}\}$ ,  $R = \{\text{all real numbers}\}$

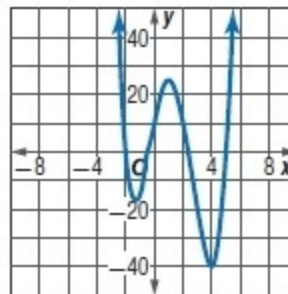
18. Determine the consecutive integer values of  $x$  between which each real zero is located for

$$f(x) = 3x^2 - 3x - 1.$$

**ANSWER:**

between  $-1$  and  $0$  and between  $1$  and  $2$

**Refer to the graph.**



19. Estimate the  $x$ -coordinate of every turning point, and determine if those coordinates are relative maxima or relative minima.

**ANSWER:**

maximum at  $x \approx 1$ ; minima at  $x \approx -1.5$  and  $x \approx 4$

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20. Estimate the  $x$ -coordinate of every zero.

*ANSWER:*

$-2, -0.5, 2.5, 5$

21. What is the least possible degree of the function?

*ANSWER:*

4