ACT REVIEW PROBLEMS

1. Which of the following equations has y varying directly as the square of w and inversely as the cube of t?

   A. $\frac{y^2}{t^3} = w$ B. $\frac{w^2}{t^3} = y$

   C. $\frac{t^2}{w^3} = y$ D. $\frac{\sqrt{w}}{\sqrt[3]{t}} = y$ E. $\frac{w^2}{y^3} = t$

2. How many points do the graphs of all 3 of the following equations have in common?

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

   A. 0
   B. 1
   C. 2
   D. 3
   E. Infinitely many

3. Listed below are 5 functions, each denoted g(x) and each involving a real number constant $c \geq 2$. If $f(x) = 2^x$, which of these five functions yields the greatest value for $f(g(x))$

   A. g(x) = c(x)
   B. $g(x) = \frac{c}{x}$
   C. $g(x) = \frac{x}{c}$
   D. g(x) = x – c
   E. $g(x) = \log_c x$

4. If 2x – y = 6 and x + 4y = 12, what is the value of y?
   A. – 6
   B. 0
   C. 1
   D. 2
   E. 3

5. Which of the following is a factored form of $4x^3y + 4xy^3$

   A. $4x^3y^3(y + x)$
   B. $4xy(x^2 + y^2)$
   C. $8xy(x^2 + y^2)$
   D. $4x^3y^3$
   E. $8x^4y^4$

6. You are told that m = ak + 5 where $a \neq 0$. Which of the following equations expresses k in terms of a and m?

   A. $k = \frac{m-5}{a}$ B. $k = \frac{5-m}{a}$

   C. $k = \frac{m+5}{a}$ D. $k = \frac{m}{a} - 5$ E. $k = \frac{m}{a} + 5$

7. For all nonzero r, t, and z values, $\frac{16r^3tz^5}{-4rt^3z^2} = ?$

   A. $-\frac{4z^3}{r^2t^2}$
   B. $-\frac{4z^3}{r^2t^2}$
   C. $-\frac{4z^3}{r^2t^2}$
   D. $-4r^4t^4z^7$
   E. $-4r^2t^{-2}z^3$

8. Which of the following conditions on x determines when $(x-2)(x+3) - (x^2 - 4)$ will be positive?

   F. x = - 2
   G. x > 2
   H. $x \geq 10$
   I. $2x^2 \geq 10$
   J. $x^2 - x < 6$

9. If A, B, and C are real numbers, and if ABC = 1, which of the following conditions ***must*** be true.

   F. AB is equal to $\frac{1}{C}$
   G. A, B, C must all be positive
   H. Either A = 1, B = 1, or C = 1
   I. Either A = 0, B = 0, or C = 0
   J. Either A < 1, B < 1, or C < 1

10. For what value of a would the following system of equations have an infinite number of solutions?

    $2x - y = 6$
    $8x - 4y = a$

    A. 2 B. 6 C. 8 D. 18 E. 24

11. Which of the following is a factor of $x^2 - 5x - 6$?

    F. (x – 1) G. (x + 2) H. (x – 2)
    J. (x – 3) K. (x – 6)

12. Which of the following identifies exactly those values of x that satisfy

    $5 - 2(3 - x) \geq 5x - 3(x - 1)$

    A. All real numbers
    B. $x \leq -1$ C. $x \geq \frac{1}{2}$ D. $x \leq \frac{1}{2}$
    E. No real numbers

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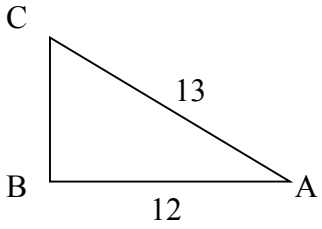
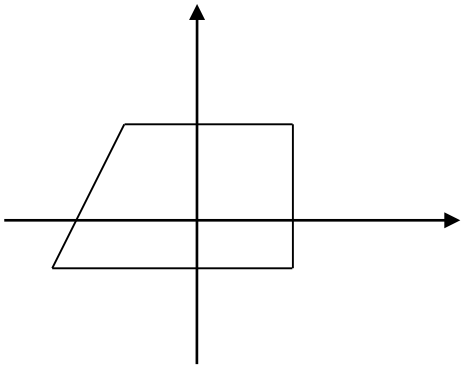
1. How many roots does the function f(x) have, if f(x) = (2x -3)(4x + 4)(5x + 2)(x – 1)?

2. One angle, $\angle$ A, has 3 times the measure of its supplement, $\angle$ B. What is the degree measure of $\angle$ A?

3. In the right triangle ABC below, what is the value of sinA? What is the value of cos C?



4. What is the area, in square units, of the trapezoid graphed below?

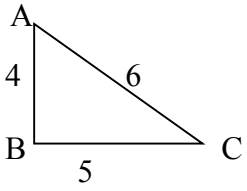


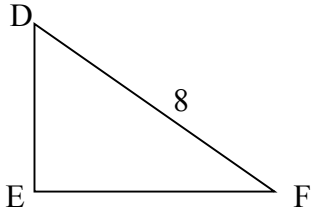
5. Simplify:

a) $\frac{a^{-2}}{b}(a^2b^2) =$

b) $\frac{x^2y}{x^{-3}y^4} =$

6. The two triangles below are similar with $\angle A \cong \angle D$. What is the perimeter of ΔDEF?





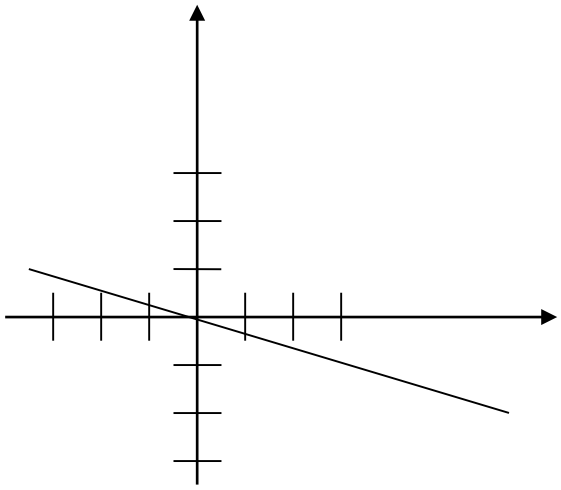
7. (Use diagram from question 6) What is the ratio of the area of ΔABC to the area of ΔDEF?

8. Which of the following equations is graphed below?

a) y = - 3x b) $y = (-\frac{1}{3})x$

c) $y = (\frac{1}{3})x$ d) y = 3x

e) y = x – 3



8. Write the equation of a circle with the center at the origin and radius 5m.

9. What is the center of the circle described by the equation: $(x - 5)^2 + (y + 3)^2 = 16$

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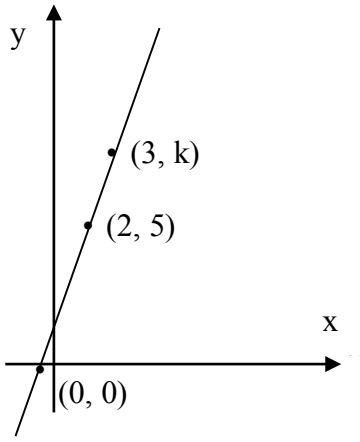
10. Write the equation of a circle with the center at (- 4, - 7) and radius $\sqrt{5}$.

11. In the (x, y) coordinate plane below, a straight line passes through the 3 indicated points. What is the value of k?

A. $-\frac{15}{2}$ B. $-\frac{6}{5}$

C. $\frac{6}{5}$ D. 6

E. $\frac{15}{2}$



12. In a laboratory experiment, Amoeba A lives 5 hours longer than Amoeba B, and Amoeba B lives twice as long as Amoeba C. If n is the lifespan of Amoeba C in hours, what is the lifespan of Amoeba A, in terms of *n*?

A. $5 + 2n$ B. $7 + n$ C. $7n$

D. $10n$ E. $2(5 + n)$

13. If the denominator is NOT zero, then $\frac{3X^2 - 3Y^2}{-X - Y}$ simplifies to:

F. -3Y – 3X
G. 3Y – 3X
H. 3
J. 3X + 3Y
K. 3X – 3Y

14. Which of the following polynomials has 0 and ¾ as zeros?

A. $4x - 3$

B. $4x + 3$

C. $4x^2 + 3x$

D. $4x^2 - 3x$

E. $3x^2 - 4x$

15. The equation $x^2 - 10x + \boldsymbol{k} = 0$ has only one solution for x. What is the value of ***k***?

A. 0 B. 5 C. 10 D. 20 E. 25

16. The graph of the solution set for the system of equations below is a single line in the standard (x, y) coordinate plane.

$$18x - 30y = 54$$
$$6x + ky = 18$$

What must be the value of k?

A. -10 B. -6 C. $-\frac{1}{3}$ D. $\frac{3}{5}$ E. 3

17. In the standard (x, y) coordinate plane, what is the slope of the line that passes through the origin and the point $(\frac{1}{2}, \frac{2}{3})$

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18. If $x - y = 5$ and $x + y = -4$, what is the value of $x^2 - y^2$

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19. What is the slope of any line parallel to the line $3x + 5y = 8$?

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ACT I