Algebra

1. If $x = -3$, what is the value of $\frac{x^2 - 1}{x + 1}$?

   A. –4

   B. –2

   C. 2

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

   E. 5

2. Doctors use the term *maximum heart rate* (*MHR*) when referring to the quantity found by starting with 220 beats per minute and subtracting 1 beat per minute for each year of a person's age. Doctors recommend exercising 3 or 4 times each week for at least 20 minutes with your heart rate increased from its *resting heart rate* (*RHR*) to its *training heart rate* (*THR*), where

   $$THR = RHR + .65(MHR - RHR)$$

   Which of the following is closest to the *THR* of a 43-year-old person whose *RHR* is 54 beats per minute?

   A. 197
   B. 169
   C. 162
   D. 134
   E. 80

3. When getting into shape by exercising, the subject's maximum recommended number of heartbeats per minute (h) can be determined by subtracting the subject's age (a) from 220 and then taking 75% of that value. This relation is expressed by which of the following formulas?

   A. $h = .75(220 - a)$
   B. $h = .75(220) - a$
   C. $h = 220 - .75a$
   D. $.75h = 220 - a$
   E. $220 = .75(h - a)$

4. An airplane flew for 8 hours at an airspeed of x miles per hour (mph), and for 7 more hours at 325 mph. If the average airspeed for the entire flight was 350 mph, which of the following equations could be used to find x ?

A. $x + 325 = 2(350)$
B. $x + 7(325) = 15(350)$
C. $8x - 7(325) = 350$
D. $8x + 7(325) = 2(350)$
E $8x + 7(325) = 15(350)$

5. Which of the following is equivalent to $3a + 4b - (-6a - 3b)$?

A. $16ab$
B. $-3a + b$
C. $-3a + 7b$
D. $9a + b$
E. $9a + 7b$

6. What is the sum of the polynomials $3a^2b + 2a^2b^2$ and $-ab^2 + a^2b^2$?

A. $3a^2b - ab^2 + 3a^2b^2$
B. $3a^2b - ab^2 + 2a^2b^2$
C. $2a^2b + 3a^2b^2$
D. $2a^2b^3 + 2a^4b^4$
E. $-3a^3b^3 + 2a^4b$

7. Which of the following is a factor of the polynomial $x^2 - x - 20$?

A. $x - 5$
B. $x - 4$
C. $x + 2$
D. $x + 5$
E. $x + 10$

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

A. $(x + 2)$
B. $(x - 6)$
C. $(x - 3)$
D. $(x - 2)$
E. $(x - 1)$

9. If $2(x - 5) = -11$, then x = ?

A. $-\frac{21}{2}$
B. -8
C. $-\frac{11}{2}$
D. -3
E. $-\frac{1}{2}$

10. If $\frac{4}{5} + \left(-\frac{3}{10}\right) = x + 1\frac{1}{2}$, then x = ?

A. 2
B. 1
C. -1
D. -2
E. -10

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

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

12. For all $x > 0$ and $y > 0$, the radical expression $\frac{\sqrt{x}}{3\sqrt{x} - \sqrt{y}}$ is equivalent to:

A. $\frac{3x - \sqrt{xy}}{9x + y}$
B. $\frac{3x - \sqrt{xy}}{3x + y}$
C. $\frac{3x + \sqrt{xy}}{9x - y}$
D. $\frac{3x + \sqrt{xy}}{3x - y}$
E. $\frac{x}{3x - y}$

13. For all $x \neq -4$, which of the following is equivalent to the expression below?

$$\frac{x^2 + 12x + 32}{x + 4}$$

A. $x + 3$
B. $x + 8$
C. $x + 11$
D. $x + 16$
E. $x + 28$

14. Which of the following is a simplified expression equal to $\frac{9 - x^2}{x - 3}$ for all $x < -3$?

A. $3x$
B. $x + 3$
C. $x - 3$
D. $-x + 3$
E. $-x - 3$

15. What is the slope of the line with the equation $2x + 3y + 6 = 0$?

A. -6
B. -3
C. -2
D. $-\frac{2}{3}$
E. $\frac{2}{3}$

16. Point A $(-4,1)$ is in the standard (x,y) coordinate plane. What must be the coordinates of point B so that the line $x = 2$ is the perpendicular bisector of $\overline{AB}$?

A. $(-6, 1)$
B. $(-4,-1)$
C. $(-4, 3)$
D. $(-2, 1)$
E. $(8, 1)$