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## Rearranging Equations for a Variable

### Non-Calculator: Multiple Choice

$$\frac{4x + 3y}{2z} = 12$$

1. Which of the following equations correctly rearranges the above equation and expresses  $x$  in terms of  $y$  and  $z$ ?

A)  $x = \frac{24z}{4-3y}$

B)  $x = \frac{24z-3y}{4}$

C)  $x = \frac{12z-3y}{2}$

D)  $x = \frac{24z+3y}{4}$

$$16p^2 + 4q = r^2 - 9$$

2. Which of the following equations correctly rearranges the above equation to isolate  $p$  (when  $p > 0$ )?

A)  $p = \frac{\sqrt{(r^2-4q-9)}}{16}$

B)  $p = \sqrt{(4r^2 - 16q - 36)}$

C)  $p = \frac{\sqrt{(r^2-4q-9)}}{4}$

D)  $p = 16\sqrt{r^2 - 4q - 9}$

3. If  $\frac{9y+6}{z-2y} = 3y$ , then:

A)  $z = 2y + 3$

B)  $z = \frac{3y+2-2y^2}{y}$

C)  $z = \frac{2y^2-3y-2}{y}$

D)  $z = \frac{2y^2+3y+2}{y}$

4. If  $\sqrt{x-4} = y-2$ , then:

- A)  $x = y^2 - 4y$
- B)  $x = y^2 - 4y + 4$
- C)  $x = y^2 - 4y + 8$
- D)  $x = y^2 + 8$

5. If  $\frac{x}{y+2} = 2 - 3x$ , then:

- A)  $x = \frac{6y}{y+1}$
- B)  $x = \frac{2y}{3y+3}$
- C)  $x = \frac{3y}{2-3y}$
- D)  $x = \frac{2y+4}{3y+7}$

6. If  $4(x+3y)(2x-4) = 12x(2y+4)$ , then:

- A)  $y = \frac{x^2-8x}{3}$
- B)  $y = \frac{x^2+8x}{6}$
- C)  $y = \frac{x^2-8x}{6}$
- D)  $y = \frac{8x^2-8x}{3}$

7. In the quadratic equation below, what are the solutions for  $x$ ?

$$x\left(2x - \frac{1}{2}a\right) = 2p - x^2$$

- A)  $x = \frac{a \pm \sqrt{(a^2+32p)}}{4}$
- B)  $x = \frac{a \pm \sqrt{a^2+96p}}{12}$
- C)  $x = \frac{\frac{a}{2} \pm \sqrt{(a^2+32p)}}{4}$
- D)  $x = \frac{a \pm \sqrt{(a^2+2p)}}{4}$

$$P = \left[ \frac{\left(\frac{I}{2400}\right)(12+I)^M}{\left(2+\frac{I}{600}\right)^M} S \right]^2$$

8. Sandra is desperate to buy new clothes from H&M. In order to update her wardrobe, she takes out a loan. The amount she has to pay back every month,  $P$ , for a loan of  $S$  dollars with an annual interest rate of  $I$  over  $M$  months is given by the above equation. What is  $S$  in terms of the other variables?

A)  $S = \frac{\left(\frac{I}{2400}\right)(12+I)^M}{\left(2+\frac{I}{600}\right)^M} \sqrt{P}$

B)  $S = \frac{I^M}{\left(\frac{I}{2400}\right)} \sqrt{P}$

C)  $S = \frac{\left(2+\frac{I}{600}\right)^M}{\left(\frac{I}{2400}\right)(12+I)^M} P$

D)  $S = \frac{\left(2+\frac{I}{600}\right)^M}{\left(\frac{I}{2400}\right)(12+I)^M} \sqrt{P}$

$$S = \frac{C+A}{A+B+C+D}$$

9. Dee is starting up a film review website called Ripening Rutabagas. Each film is certified a score  $S$  based on the number of positive reviews it gets from critics,  $C$ , and positive reviews from audience members,  $A$ , as well as the number of negative reviews it gets from critics,  $D$ , and negative reviews it gets from audience members,  $B$ , using the above equation. How would you express the number of favorable reviews from critics compared to the other variables?

A)  $C = \frac{SA+SB+SD}{1-S}$

B)  $C = \frac{SA+SB+SD-A}{1-S}$

C)  $C = \frac{1-S}{SA+SB+SD-A}$

D)  $C = \frac{SBD}{1-S}$

10. A straight line in the format  $y = mx + c$  is graphed in the  $xy$ -plane. If the graph contains the points  $(3d, e)$  and  $(d^2, d + e)$ , which of the following expresses the slope of the line in terms of  $d$  and  $e$ ?
- A)  $\frac{2e+d}{3d+d^2}$
- B)  $d - 3$
- C)  $\frac{1}{d-3}$
- D)  $\frac{d}{3d+d^2}$
11. The density,  $d$ , of an object is found by dividing the mass,  $m$ , of the object by its volume,  $V$ . Which of the following equations gives the volume  $V$  in terms of  $d$  and  $m$ ?
- A)  $V = dm$
- B)  $V = \frac{d}{m}$
- C)  $V = \frac{m}{d}$
- D)  $V = d - m$
12. The circumference  $c$  of a circle is  $2\pi r$ . What is the radius  $r$  of a circle in terms of its circumference?
- A)  $r = \frac{2\pi}{c}$
- B)  $r = \frac{c}{2\pi}$
- C)  $r = \frac{\pi}{2c}$
- D)  $r = \frac{c\pi}{2}$
13. The volume,  $v$ , of a sphere is found by using the formula  $v = \pi r^2 h$ . What is the radius,  $r$ , of a sphere in terms of  $v$  and  $h$ ?
- A)  $r = \sqrt{\frac{v}{h\pi}}$
- B)  $r = (vh\pi)^2$
- C)  $r = \frac{v}{h\pi}$
- D)  $r = \frac{h\pi}{v^2}$

14. The distance  $d$  of a cross-country trip is found by multiplying the rate,  $r$ , of John's car by the hours,  $t$ , spent driving. If the distance of the trip was 3,000 miles and the average speed of the car was 50 miles per hour, which of the following equations allows one to solve for the time spent driving?
- A)  $t = \frac{3,000}{50}$
- B)  $t = (3,000)(50)$
- C)  $t = \frac{50}{3,000}$
- D)  $t = 3,000^{50}$
15. The perimeter,  $p$ , of a rectangle can be found by taking twice the length,  $l$ , plus twice the width,  $w$ . How can you express the width of a rectangle in terms of  $p$  and  $l$ ?
- A)  $w = \frac{p}{2} - l$
- B)  $w = l - 2p$
- C)  $w = \frac{p}{l-2}$
- D)  $w = 2pl^2$
16. The hypotenuse of a right triangle  $ABC$  is 9 inches. If side  $AB$  is 6 inches, what is the length of side  $BC$ ?
- A) 7 inches
- B) 3 inches
- C)  $3\sqrt{5}$  inches
- D) 6 inches
17. A pediatrician uses the formula  $h = 4a + 18.4$  to estimate the height  $h$  of a child, in inches in terms of age  $a$ , in years, between the ages of 1 and 5. How could you express the age of a child between 1 and 5 in terms of  $h$ ?
- A)  $a = \frac{h-18.4}{4}$
- B)  $a = -4h + 18.4$
- C)  $a = 4h - 18.4$
- D)  $a = \frac{-h+18.4}{4}$

18. Using the formula in question 17, if a child is 3 feet tall, how old is he? (Round to the nearest year.)
- A) 2
  - B) 3
  - C) 4
  - D) 5

$$KE = \frac{1}{2}mv^2$$

19. The formula for calculating kinetic energy is shown above. How could you express the mass,  $m$ , in terms of  $KE$  and  $v$ ?
- A)  $m = \frac{KE}{2v^2}$
  - B)  $m = \frac{KE}{\sqrt{v}}$
  - C)  $m = 2(KE)v^2$
  - D)  $m = \frac{2KE}{v^2}$

$$z = \frac{x - \mu}{\sigma}$$

20. The formula for calculating the  $z$  score in statistics is shown above. How could you express the mean,  $\mu$ , in terms of  $z$ ,  $x$ , and  $\sigma$ ?
- A)  $\mu = x - z\sigma$
  - B)  $\mu = z\sigma - x$
  - C)  $\mu = z - x\sigma$
  - D)  $\mu = (x - z)\sigma$

21. Using the formula in question 20, what is  $\mu$  if  $z = 0.8$ ,  $x = 2$ , and  $\sigma = 0.25$ ?
- A)  $\mu = 2.2$
  - B)  $\mu = 1.8$
  - C)  $\mu = -1.8$
  - D)  $\mu = 0.3$

22. For the formula  $a = 3b^2 - 2c + \frac{1}{4}d$ , what is  $b$  in terms of  $a$ ,  $c$ , and  $d$ ?

A)  $b = \sqrt{\frac{4a+8c-d}{12}}$

B)  $b = \sqrt{\frac{a+8c-4d}{3}}$

C)  $b = a - \sqrt{\frac{8c-d}{12}}$

D)  $b = 2a + \sqrt{\frac{8c-4d}{3}}$