

## Proportionality & Variation - Worksheet

### Lesson: Arithmetic

- 1) Determine the constant of proportionality if  $y$  varies directly with  $x^2$ , and  $y = 18$  when  $x = 3$ .
  - a. 6
  - b. 2
  - c. 4
  - d. 12
  
- 2) Determine the constant of proportionality if  $y$  varies inversely with  $\sqrt{x+7}$ , and  $y = 24$  when  $x = 2$ .
  - a. 36
  - b. 48
  - c. 54
  - d. 72
  
- 3) Let  $x$ ,  $y$ , and  $z$  be numbers that vary with one another. If  $x = 32$  when  $y = 4$  and  $z = 2$ ,  $x = 24$  when  $y = 2$  and  $z = 6$ , and  $x = 63$  when  $y = 3$  and  $z = 7$ , which of the following equations can represent the relationship between  $x$ ,  $y$ , and  $z$ ?
  - a.  $x = 8y/z$
  - b.  $yz = 32/x^2$
  - c.  $x = (y^2)(z)$
  - d.  $xz = y/8$
  
- 4) Which of the following is true of the equation  $x = 48/y$ ?
  - a. For any pairs  $(x,y)$ ,  $x/y = 48$ .
  - b.  $x$  is inversely proportional to  $1/y$ .
  - c. The value of  $(xy)^2$  is 2204.
  - d. For  $x \geq 8$ ,  $x > y$ .

- 5) Seven workers can create 14 doors in 6 days. Assuming each worker is equally efficient, how many doors can be produced by 28 workers in 12 days?
- 30 doors
  - 28 doors
  - 56 doors
  - 112 doors
- 6) If  $x : y = 7 : 4$  and  $y : z = 5 : 3$ , determine the ratio  $x : y : z$  in simplest terms.
- $35 : 20 : 12$
  - $35 : 20 : 28$
  - $28 : 20 : 35$
  - $20 : 35 : 28$
- 7) Which of the following shows inverse proportionality between variables?
- $\frac{x}{y} = 62$
  - $x/y = 38(y^2/x)$
  - $x(\sqrt{y^3}) = 50$
  - $x + y(x) = 50$
- 8) Determine the sum of  $x$ ,  $y$ , and  $z$  if  $x$  is proportional to the square of  $y$  and inversely proportional to the cube root of  $z$ , the constant of proportionality is 3,  $x = 36$ , and  $y = 4$ .
- $1072/27$
  - $4283/729$
  - $1144/27$
  - $2342/81$

9) 8 students can eat 40 slices of pizza in a span of 20 minutes. Assuming each student eats at an equal rate, many minutes will it take 20 students to eat 100 slices of pizza?

- a. 30 minutes
- b. 45 minutes
- c. 20 minutes
- d. 100 minutes

10) Which of the following is false about direct proportionality?

- a. The constant of proportionality is fixed in a specific equation.
- b. Direct proportionality between two variables is always linear in nature.
- c.  $(0, 0)$  is always a solution in direct proportionality.
- d. As one variable increases, the other one may increase drastically.

11) Determine  $x + y$  if  $x$  and  $y$  are such that  $x : (y - 20) = 4 : 3$  and  $(x + 7) : (y - 5) = 23 : 27$ .

- a. 48
- b. 44
- c. 40
- d. 36

12) Which of the following can possibly show the following relationship between  $x, y, z$  and  $w$ ? " $x$  is inversely proportional to the square of  $y$ , while  $y$  is inversely proportional to the cube root of  $z$  and proportional to the cube of  $w$ "

- a.  $(\frac{x}{\sqrt[3]{z}})(y^2)(w^3) = 64$
- b.  $(x)(y^2)(\sqrt[3]{z}) = 32w^3$
- c.  $x = [y^2(w^3)] \div (\sqrt[3]{z})$
- d.  $(xy^2)/(\sqrt[3]{z}) = w^3$

13) In elementary physics,  $KE = \frac{1}{2}mv^2$ , where  $KE$ ,  $m$ , and  $v$  are representative of kinetic energy, mass, and velocity respectively. If mass is changed threefold while velocity is halved, what is the value given by  $(new\ KE)/(old\ KE)$ ?

- a.  $4/3$
- b.  $3/2$
- c.  $3/4$
- d.  $9/2$

14) Every time Jack claps ( $J$ ) the number of hairs ( $H$ ) on his bald friend doubles. Which of the following is true about this?

- a.  $J$  and  $H$  are inversely related because as Jack claps more slowly, the number of hairs will still increase.
- b.  $J$  and  $H$  are directly related and as  $J$  increases,  $H$  increases.
- c.  $J$  and  $H$  are neither inversely related nor directly related.
- d. There is not enough information is available.

15) The energy ( $E$ ) generated by a force applied onto an object is  $mad$ ; that is, mass \* acceleration \* distance. If acceleration is doubled while distance is quadrupled, and energy generated is an eighth after the change, determine the value of  $new\ mass / old\ mass$ .

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| a. $1/4$ | c. $1$    |
| b. $1/8$ | d. $1/64$ |