

A.N.5: Direct Variation: Solve algebraic problems from situations that involve fractions, decimals, percents (decrease/increase and discount), proportionality/direct variation

- 1 In a molecule of water, there are two atoms of hydrogen and one atom of oxygen. How many atoms of hydrogen are in 28 molecules of water?
 - 1) 14
 - 2) 29
 - 3) 42
 - 4) 56
- 2 A cake recipe calls for 1.5 cups of milk and 3 cups of flour. Seth made a mistake and used 5 cups of flour. How many cups of milk should he use to keep the proportions correct?
 - 1) 1.75
 - 2) 2
 - 3) 2.25
 - 4) 2.5
- 3 The number of calories burned while jogging varies directly with the number of minutes spent jogging. If George burns 150 calories by jogging for 20 minutes, how many calories does he burn by jogging for 30 minutes?
 - 1) 100
 - 2) 180
 - 3) 200
 - 4) 225
- 4 Jordan and Missy are standing together in the schoolyard. Jordan, who is 6 feet tall, casts a shadow that is 54 inches long. At the same time, Missy casts a shadow that is 45 inches long. How tall is Missy?
 - 1) 38 in
 - 2) 86.4 in
 - 3) 5 ft
 - 4) 5 ft 6 in
- 5 On a map, 1 centimeter represents 40 kilometers. How many kilometers are represented by 8 centimeters?
 - 1) 5
 - 2) 48
 - 3) 280
 - 4) 320
- 6 On a map, 1 inch represents 3 miles. How many miles long is a road that is $2\frac{1}{2}$ inches long on the map?
 - 1) $\frac{1}{2}$
 - 2) $5\frac{1}{2}$
 - 3) $6\frac{1}{2}$
 - 4) $7\frac{1}{2}$
- 7 Which equation represents the direct variation relationship of the equation $\frac{x}{y} = \frac{1}{2}$?
 - 1) $y = x + \frac{1}{2}$
 - 2) $y = 2x$
 - 3) $y = 3x$
 - 4) $x = 2y$
- 8 If x varies directly as y , and $x = 8$ when $y = 24$, what is the value of x when $y = 6$?
 - 1) 1
 - 2) 2
 - 3) 3
 - 4) 4
- 9 Segment RS is parallel to segment TU . If the slope of $\overline{RS} = \frac{5}{8}$ and the slope of $\overline{TU} = \frac{x}{24}$, the value of x is
 - 1) 20
 - 2) 15
 - 3) 10
 - 4) 5

- 10 If a machine that prints designs on T-shirts prints 500 shirts in 3 hours, how many hours will it take to print designs on 1,800 shirts?
- 6
 - 9.8
 - 10.8
 - 12
- 11 The perimeter of an equilateral triangle varies directly as the length of a side. When the length of a side is doubled, the perimeter of the triangle is
- halved
 - doubled
 - multiplied by 3
 - divided by 3
- 12 If the circumference of a circle is doubled, the diameter of the circle
- remains the same
 - increases by 2
 - is multiplied by 4
 - is doubled

- 13 Which table does *not* show an example of direct variation?

x	y
1	4
2	8
3	12
4	16

1)

x	y
2	24
4	12
6	8
8	6

2)

x	y
1	$\frac{1}{2}$
2	1
3	$\frac{3}{2}$
4	2

3)

x	y
-4	-20
-3	-15
-2	-10
-1	-5

4)

- 14 Granola bars cost \$0.55 each. Which table represents this relationship?

Number of Bars	Total Cost
0	\$0.00
2	1.00
4	2.00

1)

Number of Bars	Total Cost
0	\$0.00
2	1.10
4	2.20

2)

Number of Bars	Total Cost
0	\$0.55
2	0.55
4	0.55

3)

Number of Bars	Total Cost
0	\$0.55
2	1.10
4	2.20

4)

- 15 The table below represents the number of hours a student worked and the amount of money the student earned.

Number of Hours (h)	Dollars Earned (d)
8	\$50.00
15	\$93.75
19	\$118.75
30	\$187.50

Write an equation that represents the number of dollars, d , earned in terms of the number of hours, h , worked. Using this equation, determine the number of dollars the student would earn for working 40 hours.

- 16 If a girl 1.2 meters tall casts a shadow 2 meters long, how many meters tall is a tree that casts a shadow 75 meters long at the same time?
- 17 A 12-foot tree casts a 16-foot shadow. How many feet tall is a nearby tree that casts a 20-foot shadow at the same time?
- 18 If the instructions for cooking a turkey state “Roast turkey at 325° for 20 minutes per pound,” how many *hours* will it take to roast a 20-pound turkey at 325° ?
- 19 An image of a building in a photograph is 6 centimeters wide and 11 centimeters tall. If the image is similar to the actual building and the actual building is 174 meters wide, how tall is the actual building, in meters?
- 20 Julio’s wages vary directly as the number of hours that he works. If his wages for 5 hours are \$29.75, how much will he earn for 30 hours?
- 21 Fran’s favorite photograph has a length of 6 inches and a width of 4 inches. She wants to have it made into a poster with dimensions that are similar to those of the photograph. She determined that the poster should have a length of 24 inches. How many inches wide will the poster be?

A.N.5: Direct Variation: Solve algebraic problems from situations that involve fractions, decimals, percents (decrease/increase and discount), proportionality/direct variation

Answer Section

1 ANS: 4

$$\frac{2 \text{ atoms}}{1 \text{ molecule}} = \frac{x}{28 \text{ molecules}}$$

$$x = 56$$

REF: 010117a

2 ANS: 4

$$\frac{1.5 \text{ cups of milk}}{3 \text{ cups of flour}} = \frac{x}{5 \text{ cups of flour}}$$

$$3x = 7.5$$

$$x = 2.5$$

REF: 060505a

3 ANS: 4

$$\frac{150}{20} = \frac{x}{30}$$

$$20x = 4500$$

$$x = 225$$

REF: 081101ia

4 ANS: 3

$$\frac{6}{54} = \frac{x}{45}$$

$$54x = 270$$

$$x = 5$$

REF: 080603a

5 ANS: 4

$$\frac{40}{1} = \frac{x}{8}$$

$$x = 320$$

REF: 080201a

6 ANS: 4

$$\frac{3}{1} = \frac{x}{2\frac{1}{2}}$$

$$x = 7\frac{1}{2}$$

REF: 010818a

7 ANS: 2

REF: 010708a

8 ANS: 2

$$\frac{8}{24} = \frac{x}{6}$$

$$x = 2$$

REF: 010806a

9 ANS: 2

$$\frac{5}{8} = \frac{x}{24}$$

$$x = 15$$

REF: 060801a

10 ANS: 3

$$\frac{500 \text{ shirts}}{3 \text{ hours}} = \frac{1800 \text{ shirts}}{x}$$

$$500x = 5400$$

$$x = 10.8$$

REF: 080809a

11 ANS: 2

REF: 080101a

12 ANS: 4

REF: 060215a

13 ANS: 2

In (1), (3) and (4), the quotient of y and x remains constant at $\frac{4}{1}, \frac{1}{2}$ and $\frac{5}{1}$. In (2), the product of y and x remains constant at 48.

REF: 080005a

14 ANS: 2

REF: 010902a

15 ANS:

$$d = 6.25h, 250. \quad d = 6.25(40) = 250$$

REF: 010933ia

16 ANS:

$$\frac{1.2}{2} = \frac{x}{75}$$

$$45. \quad 2x = 90$$

$$x = 45$$

REF: 060124a

17 ANS:

$$\frac{12}{16} = \frac{x}{20}$$

$$15. \quad 16x = 240$$

$$x = 15$$

REF: 010222a

18 ANS:

$$\frac{20 \text{ min}}{11 \text{ lb}} = \frac{x}{20 \text{ lb}}$$

$$6\frac{2}{3} \cdot x = 400 \text{ min}$$

$$\frac{400}{60} = 6\frac{2}{3} \text{ hours}$$

REF: 060223a

19 ANS:

$$\frac{11}{6} = \frac{x}{174}$$

$$319. \quad 6x = 1914$$

$$x = 319$$

REF: 080223a

20 ANS:

$$\begin{aligned} \$178.50. \quad \frac{29.75}{5} &= \frac{w}{30} \\ w &= 178.50 \end{aligned}$$

REF: 010431a

21 ANS:

$$\begin{aligned} 16. \quad \frac{6}{4} &= \frac{24}{x} \\ x &= 16 \end{aligned}$$

REF: 010532a