

Dependent and Independent Variables: practice solutions, Grade 6 – download the PDF

Written solutions to the chapter problems. Check each step, then correct yourself.

1 Name the variables



- a. The calories burned depend on the time, so the independent variable is the minutes and the dependent variable is the calories.
- b. The price depends on how many pizzas you order: independent = number of pizzas, dependent = total price.
- c. The level in the barrel depends on the rain: independent = amount of rain, dependent = water level.

2 Complete the table



Multiply each x by 4: $4 \times 1 = 4$, $4 \times 2 = 8$, $4 \times 3 = 12$, $4 \times 4 = 16$, $4 \times 5 = 20$.

x	1	2	3	4	5
y	4	8	12	16	20

3 Movie tickets



- a. Each ticket costs 9 dollars, so $c = 9t$.
- b. $c = 9 \times 6 = 54$. Six tickets cost 54 dollars.
- c. $9t = 117$, so $t = 117 \div 9 = 13$. The group bought 13 tickets.

4 Use the rule



Add 7 to each input: $3 + 7 = 10$, $8 + 7 = 15$, $15 + 7 = 22$. So $y = 10, 15$ and 22 .

5 From a table to ordered pairs



The pairs are $(1, 2)$, $(2, 4)$ and $(3, 6)$. The independent variable (hours) comes first and goes on the horizontal axis. The dependent variable (pages) comes second and goes on the vertical axis.

6 True or false?



- a. False. d is found by multiplying t by 5, so d depends on t : it is the dependent variable.
- b. True. In $(4, 20)$, $x = 4$ is the input and $y = 20 = 5 \times 4$ is the output.
- c. True. This is the convention: the independent variable on the horizontal axis.
- d. False. $y = 18 + 3 = 21$. The value $y = 6$ goes with $x = 3$.

7 Growing bamboo



a.

d	1	2	3	4	5
h	2	4	6	8	10

b. $h = 2d$.

c. $h = 2 \times 7 = 14$ inches. In centimeters, $14 \times 2.54 = 35.56$, about 35.6 cm.

8 Find the rule: adding



The outputs go up by 1 as the inputs go up by 1. Since $9 = 2 + 7$, $10 = 3 + 7$, $11 = 4 + 7$ and $12 = 5 + 7$, the rule is $y = x + 7$. For $x = 40$, $y = 47$.

9 Find the rule: multiplying



The outputs go up by 6 each time and y is 6 times x in every column, so $y = 6x$. For $x = 10$, $y = 60$. For $y = 96$, $6x = 96$, so $x = 16$.

10 Reading a graph



a. The savings depend on the number of weeks. Independent: w . Dependent: s .

b. The points go up by 4 for each week: 4 dollars per week.

c. $s = 4w$.

d. $s = 4 \times 8 = 32$. After 8 weeks she will have saved 32 dollars.

11 Cousins



a. $L = a + 4$.

b.

a	6	9	12
L	10	13	16

c. $a + 4 = 20$, so $a = 16$. The cousin is 16.

d. No. $10 : 6$ and $13 : 9$ are different ratios ($\frac{10}{6} \approx 1.67$ and $\frac{13}{9} \approx 1.44$), so the relationship is not a constant ratio.

12 The jogger



a. Each 5 minutes adds 0.5 mile, so the rate is $\frac{0.5}{5} = 0.1$ mile per minute (that is 6 miles per hour).

b. $d = 0.1m$.

c. $d = 0.1 \times 45 = 4.5$. She runs 4.5 miles, about 7.2 kilometers.

13 Is the rate constant?



The cost goes up by $6 - 3 = 3$, then $10 - 6 = 4$, then $15 - 10 = 5$. The change is not always the same, so the rate is not constant. If $c = kn$, then $k = 3$ from the first pair, but $3 \times 3 = 9 \neq 10$. So the relationship cannot be written as $c = kn$.

14 Trail mix ratio



a.

n	2	4	6	8
r	3	6	9	12

b. $(2, 3)$, $(4, 6)$, $(6, 9)$, $(8, 12)$.

c. Yes. The ratio $3 : 2$ is the same for every pair and $(0, 0)$ fits, so the points are on a line through the origin.

d. The rule is $r = \frac{3}{2}n$. For $n = 10$, $r = \frac{3}{2} \times 10 = 15$ cups.

15 Taxi fare



a. $c = 2m + 3$.

b.

m	0	1	2	3	4	5
c	3	5	7	9	11	13

c. The cost goes up by 2 dollars for each extra mile, so the constant rate is 2 dollars per mile. The 3 dollars is the starting fee, not part of the rate.

d. $2m + 3 = 25$, so $2m = 22$ and $m = 11$. The ride was 11 miles (about 17.7 km).

16 Two cyclists



- a. Ana. Her line is steeper: she reaches 60 miles at $t = 5$ while Ben reaches 45 miles.
- b. Ana: $d = 12t$. Ben: $d = 9t$.
- c. Ana: $12 \times 3 = 36$ miles. Ben: $9 \times 3 = 27$ miles. The difference is $36 - 27 = 9$ miles.
- d. The gap is $12t - 9t = 3t$. We need $3t = 12$, so $t = 4$ hours.

17 Find the mistake



The rule works for $x = 1$ because $1 + 3 = 4$. But for $x = 2$, $2 + 3 = 5 \neq 8$. A rule must work for every pair. Here y is 4 times x each time, so the correct rule is $y = 4x$. For $x = 25$, $y = 100$.

18 The printer



- a. $p = 18m$.
- b. $p = 18 \times 10 = 180$ pages.
- c. $18m = 135$, so $m = 135 \div 18 = 7.5$. It takes 7.5 minutes.
- d. The number of pages printed depends on the time, so m is independent and p is dependent.

19 A line that misses the origin



- a. The pair is $(0, 4)$. The line starts at height 4 on the vertical axis, not at the origin.
- b. y goes up by 1 for each step of 1 in x , so the rate is 1.
- c. At $x = 1$, $\frac{y}{x} = \frac{5}{1} = 5$. At $x = 4$, $\frac{y}{x} = \frac{8}{4} = 2$. The ratios differ, so $y : x$ is not constant.
- d. A constant ratio would give $y = kx$, which always passes through $(0, 0)$. This line passes through $(0, 4)$ instead.

20 Your own situation



Sample answer. A baker packs 6 muffins in each box. Let b be the number of boxes (independent) and m the number of muffins (dependent). The equation is $m = 6b$.

b	1	2	3	4
m	6	12	18	24

Any situation with 6 items per group works, as long as the table follows the same rule.

21 A road trip



- a. $d = 55t$.
- b. $d = 55 \times 3.5 = 192.5$ miles.
- c. $55t = 330$, so $t = 330 \div 55 = 6$ hours.
- d. $55 \times 1.609 = 88.495$, about 88.5 kilometers per hour.

22

Missing values

For $y = 35$: $7x = 35$, so $x = 5$. For $x = 10$: $y = 70$. For $y = 63$: $7x = 63$, so $x = 9$. Check the first column: $7 \times 2 = 14$. The missing values are 5, 70 and 9.

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