

Name _____

Date _____

12.3 Direct proportion — worksheet

Recognise direct proportion and solve problems with it, using the unitary method. · 43 questions · Show your working.

Remember

- Two quantities are in **direct proportion** when doubling one doubles the other.
- Then dividing one by the other always gives the **same number** — the rate.
- The **unitary method**: find the value of one, then multiply.
- It is two steps: divide to get one, multiply to get many.
- The graph of two directly proportional quantities is a **straight line through the origin**.
- A taxi fare is **not** directly proportional to distance — the fixed charge lifts the graph off the origin.
- In **inverse** proportion, doubling one halves the other: twice as many workers, half the time.
- Ask “does zero of one give zero of the other?” — it is the quickest test for direct proportion.

A · Fluency — Find one, then scale up.

- 1 3 pens cost \$12. What do 5 pens cost, in dollars?

- 2 4 pens cost \$20. What do 7 pens cost, in dollars?

- 3 5 pens cost \$35. What do 8 pens cost, in dollars?

- 4 6 pens cost \$18. What do 10 pens cost, in dollars?

- 5 2 pens cost \$9. What do 6 pens cost, in dollars?

- 6 8 pens cost \$24. What do 5 pens cost, in dollars?

- 7 7 pens cost \$63. What do 4 pens cost, in dollars?

- 8 9 pens cost \$45. What do 6 pens cost, in dollars?

- 9 10 pens cost \$65. What do 4 pens cost, in dollars?

- 10 12 pens cost \$96. What do 3 pens cost, in dollars?

- 11 4 identical bags hold 200 g altogether. How much do 6 bags hold, in grams?

- 12 5 identical bags hold 150 g altogether. How much do 8 bags hold, in grams?

- 13 3 identical bags hold 180 g altogether. How much do 7 bags hold, in grams?
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- 14 6 identical bags hold 240 g altogether. How much do 4 bags hold, in grams?
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- 15 8 identical bags hold 320 g altogether. How much do 5 bags hold, in grams?
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- 16 2 identical bags hold 90 g altogether. How much do 9 bags hold, in grams?
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- 17 y is directly proportional to x . When $x = 2$, $y = 10$. What is y when $x = 6$?
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- 18 y is directly proportional to x . When $x = 3$, $y = 21$. What is y when $x = 9$?
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- 19 y is directly proportional to x . When $x = 4$, $y = 36$. What is y when $x = 12$?
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- 20 y is directly proportional to x . When $x = 5$, $y = 40$. What is y when $x = 15$?
-
- 21 y is directly proportional to x . When $x = 3$, $y = 12$. What is y when $x = 21$?
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B · Reasoning — When proportion is direct, and when not.

- 22 What does **directly proportional** mean?
- ☐ One goes up as the other goes down
 - ☐ When one doubles, so does the other
 - ☐ They are equal
 - ☐ They add to a fixed total
- 23 What is the **unitary method**?
- ☐ Finding the total
 - ☐ Finding the value of one, then scaling up
 - ☐ Adding the parts
 - ☐ Dividing by two
- 24 5 pens cost \$35. What is the first step to find the cost of 8?
- ☐ Multiply 35 by 8
 - ☐ Divide 35 by 5 to find one pen
 - ☐ Add 3 to 35
 - ☐ Divide 8 by 5
- 25 A graph of two directly proportional quantities ...
- ☐ curves upwards
 - ☐ is a straight line through the origin
 - ☐ is horizontal
 - ☐ is a straight line not through the origin
- 26 Is the cost of petrol directly proportional to the number of litres?
- ☐ Yes
 - ☐ No

- 27** Is a taxi fare directly proportional to the distance?
☐ Yes
☐ No
- 28** If 3 workers take 6 hours, how long would 6 workers take, assuming they work at the same rate?
☐ 12 hours
☐ 6 hours
☐ 3 hours
☐ It cannot be found
- 29** How can you tell whether two quantities are directly proportional from a table?
☐ The values increase
☐ Dividing one by the other always gives the same number
☐ They add to a constant
☐ You cannot tell

C · Challenge — Awkward numbers and working back.

- 30** 7 books cost \$91. What do 11 books cost, in dollars?

- 31** A recipe for 4 people uses 300 g of rice. How much for 10 people, in grams?

- 32** A car uses 12 litres for 96 km. How far on 20 litres, in km?

- 33** 9 identical tiles weigh 45 kg. How many tiles weigh 30 kg?

- 34** 3 machines fill 240 bottles an hour. How many do 7 machines fill in an hour?

- 35** A wall of 8 m² needs 2 litres of paint. How many m² will 7 litres cover?

D · Word problems — Prices, fuel, recipes and maps.

- 36** 4 apples cost \$6. What do 10 apples cost, in dollars?

- 37** A car travels 150 km on 10 litres. How far on 4 litres, in km?

- 38** 5 tickets cost \$40. What do 9 tickets cost, in dollars?

- 39** A recipe for 6 uses 450 g of flour. How much for 8, in grams?

- 40** A printer does 240 pages in 8 minutes. How many in 15 minutes?

41 A tap fills 90 litres in 6 minutes. How long to fill 240 litres, in minutes?

42 3 kg of rice feeds 24 people. How many does 5 kg feed?

43 A map scale means 4 cm represents 10 km. What does 14 cm represent, in km?
