# 3.8 Inverse Proportion: Test Pack

Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

**Answer ALL questions. Show all your working.**

**1** State whether each pair of quantities is directly proportional, inversely proportional, or neither.

**(a)** The time taken to fill a bath and the number of taps open (all taps are identical). **(1)**

**(b)** The cost of 1 kg of apples and the number of kilograms bought when there is a fixed total budget of £6. **(1)**

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**2** Solve the equation $7 = k/x$ given that $x = 0.5$. Find k, then state $k/x$ when $x = 2.5$.

**(3)**

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**3** A photographer says the exposure is inversely proportional to shutter speed. If an exposure of 1/60 s gives correct exposure at f-number fixed, what exposure corresponds to shutter speed 1/240 s? State whether exposure increases or decreases.

**(2)**


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**4** Two variables a and b are inversely proportional. When a = 10, b = 1.5. When a = 25, what is b? Show your working.

**(3)**

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**5** Stretch: The intensity I of light from a point source varies inversely with the square of the distance d. Two lamps give intensities I1 and I2 at distances d1 and d2 respectively. Lamp A at 3 m gives intensity 80 units. Lamp B at 6 m gives intensity 30 units. Are these two lamps likely to be identical point sources? Justify your answer with calculation.

**(3)**

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**6** Stretch: A recipe requires an amount of spice s that varies inversely with the number of servings n. A recipe uses 2 teaspoons for 8 servings. How many teaspoons are needed for 30 servings? Give your answer as a fraction and as a decimal to two decimal places.

**(3)**

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**7** y is inversely proportional to x. When x = 3, y = 20. Work out the value of y when x = 4.

**(2)**


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**8** The table shows pairs of values of two quantities that are directly proportional.

| x | 8 | 4 |
|---|---|---|
| y | 32 | ? |

Work out the missing value.

**(2)**

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**9** y is directly proportional to x. When x = 8, y = 40. Work out the value of y when x = 16.

**(2)**

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**10** y is inversely proportional to x. When x = 3, y = 40. Work out the value of y when x = 20.

**(2)**

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**11** A tank is emptied by 10 identical pumps in 20 hours. How long would 5 of these pumps take to empty it?

**(3)**


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**12** The table shows pairs of values of two quantities that are directly proportional.

| x | 9 | 15 |
|---|---|---|
| y | 45 | ? |

Work out the missing value.

**(2)**

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**13** y is inversely proportional to x. When x = 6, y = 12. Work out the value of y when x = 12.

**(2)**

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**14** A tank is emptied by 12 identical pumps in 24 hours. How long would 4 of these pumps take to empty it?

**(3)**

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**15** The table shows pairs of values of two quantities that are directly proportional.

| x | 5 | 9 |
|---|---|---|
| y | 10 | ? |

Work out the missing value.

**(2)**


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**16** The table shows pairs of values of two quantities that are directly proportional.

| x | 4 | 11 |
|---|---|---|
| y | 36 | ? |

Work out the missing value.

**(2)**

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**17** The pressure P of a gas varies inversely with its volume V at constant temperature, P = k/V. If pressure is 2.5 kPa when volume is 8 litres, find the pressure when volume is 5 litres.

**(3)**

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**18** A printing company assigns identical printers to a job. The time taken is inversely proportional to the number of printers used, assuming each printer works at the same rate and the same total work is required. It takes 8 printers 15 hours to complete the job. How many hours would 12 printers take to complete the same job?

**(3)**

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**19** In y = k/x, x = 8 and y = 5. Find k.

**(1)**


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# Mark scheme · 3.8 Inverse Proportion: Test Pack

## Question 1

(a) Inversely proportional (oe) **B1**

(a) Answer: **Inversely proportional**

(b) Inversely proportional (oe) **B1**

(b) Answer: **Inversely proportional**

## Question 2

find k from 7 = k/0.5 giving k = 7*0.5 = 3.5 **M1**

substitute k and x = 2.5 to get value **M1**

1.4 cao **A1**

Answer: **1.4**

## Question 3

use inverse proportion: exposure * shutter = k; k = 1/60 * e where e is 1 at 1/60 -> k = 1/60 or reason: change by factor 240/60 **M1**

exposure at 1/240 is 4 times smaller, i.e. 1/240 gives exposure 1/4 of original, so exposure decreases (state decrease) **A1**

Answer: **Exposure is 1/4 of the original; exposure decreases**

## Question 4

find k = 10*1.5 = 15 **M1**

compute b = 15/25 **M1**

3/5 or 0.6 cao **A1**

Answer: **3/5**

## Question 5

calculate k for lamp A: k = I*$d^2$ = 80*9 = 720 **M1**

calculate k for lamp B: k = 30*36 = 1080 **M1**

conclude not identical because k values differ (720 vs 1080) with correct justification **A1**

Answer: **No; $k_A$ = 720 and $k_B$ = 1080, so they are not identical**

## Question 6

find k = s*n = 2*8 = 16 **M1**

compute s = 16/30 = 8/15 **M1**

8/15 and 0.53 (0.533... rounded to 0.53) cao **A1**

Answer: **8/15; 0.53**

## Question 7

y = k/x with k = 3 x 20 = 60 **M1**

15 cao **A1**

Answer: **15**

## Question 8

32 ÷ 8 = 4 **M1**

16 cao **A1**

Answer: **16**

## Question 9

y = kx with k = 40 ÷ 8 = 5 **M1**

80 cao **A1**

Answer: **80**

## Question 10

y = k/x with k = 3 x 40 = 120 **M1**

6 cao **A1**

Answer: **6**

## Question 11

10 x 20 = 200 **M1**

200 ÷ 5 **M1**

40 hours cao **A1**

Answer: **40 hours**

## Question 12

45 ÷ 9 = 5 **M1**

75 cao **A1**

Answer: **75**

## Question 13

y = k/x with k = 6 x 12 = 72 **M1**

6 cao **A1**

Answer: **6**

## Question 14

12 x 24 = 288 **M1**

288 ÷ 4 **M1**

72 hours cao **A1**

Answer: **72 hours**

## Question 15

10 ÷ 5 = 2 **M1**

18 cao **A1**

Answer: **18**

## Question 16

36 ÷ 4 = 9 **M1**

99 cao **A1**

Answer: **99**

## Question 17

find k = P*V = 2.5*8 = 20.0 **M1**

substitute V=5: P = 20/5 **M1**

4 kPa cao **A1**

Answer: **4 kPa**

## Question 18

use inverse proportion: k = printers*time = 8*15 = 120 or state time = k/printers **M1**

substitute: time = 120/12 **M1**

10 hours cao **A1**

Answer: **10 hours**

## Question 19

k = 40 cao **B1**

Answer: **k = 40**


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