7.3 Direct and Inverse Proportion Depth: 1-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 P is directly proportional to Q. When Q = 5, P = 30. Find the value of P when Q = 9.

(Total for Question 1 is 2 marks)

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2 E is directly proportional to the square root of v. When v = 36, E = 54. Find the value of E when v = 9.

(Total for Question 2 is 3 marks)

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3 A is inversely proportional to the square of n. When n = 2, A = 100. Find a formula for A in terms of n.

(Total for Question 3 is 2 marks)

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4 A is inversely proportional to the square of n. When n = 4, A = 180. Find the positive value of n when A = 80.

(Total for Question 4 is 4 marks)

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5 y is directly proportional to the square root of x. When x = 36, y = 30. Find the value of y when x = 9.

(Total for Question 5 is 3 marks)

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6 E is directly proportional to the square of v. When v = 2, E = 24. Find a formula for E in terms of v.

(Total for Question 6 is 2 marks)

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7 T is directly proportional to the square root of l. When l = 36, T = 18. Find the value of T when l = 64.

(Total for Question 7 is 3 marks)

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8 F is directly proportional to the square of d. When d = 8, F = 256. Find the positive value of d when F = 36.

(Total for Question 8 is 4 marks)

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9 P is inversely proportional to the square of t. When t = 6, P = 32. Find the value of P when t = 4.

(Total for Question 9 is 3 marks)

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10 A is directly proportional to the square of n. When n = 8, A = 384. Find the positive value of n when A = 54.

(Total for Question 10 is 4 marks)

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11 A is directly proportional to the cube of n. When n = 4, A = 128. Find the value of A when n = 2.

(Total for Question 11 is 3 marks)

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12 The table shows some values of x and y, where y is directly proportional to x^2.

x	2	4	6
y	12	48	?

(a) Find the value of k in $y = kx^2$. **(2)**

(b) Complete the table by finding the missing value of y when x = 6. **(2)**

(Total for Question 12 is 4 marks)

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13 For candles of the same height, the volume of wax used, V cm^3, is directly proportional to the square of the radius, r cm. A candle of radius 3 cm uses 108 cm^3 of wax.

(a) Find a formula for V in terms of r. **(2)**

.....

(b) A candle of the same height uses 320 cm^3 of wax. Find its radius, correct to 1 decimal place. **(2)**

.....

(c) The radius of a candle is increased by 50%, with the height unchanged. Find the percentage increase in the volume of wax used. **(2)**

.....

(Total for Question 13 is 6 marks)

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14 y is directly proportional to x^3. The value of x is increased by 50%. Work out the percentage increase in the value of y.

(Total for Question 14 is 3 marks)

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Mark scheme · 7.3 Direct and Inverse Proportion Depth: 1-hour Pack

Question 1

finds the constant of proportionality k = 30/5 (=6), or uses a valid scale factor method **M1**

P = 54 cao **A1**

Answer: P = 54

Question 2

sets up equation with a constant of proportionality **M1**

k = 9 **A1**

E = 27 cao **A1**

Answer: E = 27

Question 3

uses a constant of proportionality in a correct relationship **M1**

$A = 400/n^2$ oe **A1**

Answer: $A = 400/n^2$

Question 4

sets up equation with a constant of proportionality **M1**

k = 2880 **A1**

substitutes and solves for the unknown variable **M1**

n = 6 cao **A1**

Answer: n = 6

Question 5

sets up equation with a constant of proportionality **M1**

k = 5 **A1**

y = 15 cao **A1**

Answer: y = 15

Question 6

uses a constant of proportionality in a correct relationship **M1**

$E = 6v^2$ oe **A1**

Answer: $E = 6v^2$

Question 7

sets up equation with a constant of proportionality **M1**

k = 3 **A1**

T = 24 cao **A1**

Answer: T = 24

Question 8

sets up equation with a constant of proportionality **M1**

k = 4 **A1**

substitutes and solves for the unknown variable **M1**

d = 3 cao **A1**

Answer: d = 3

Question 9

sets up equation with a constant of proportionality **M1**

k = 1152 **A1**

P = 72 cao **A1**

Answer: P = 72

Question 10

sets up equation with a constant of proportionality **M1**

k = 6 **A1**

substitutes and solves for the unknown variable **M1**

n = 3 cao **A1**

Answer: n = 3

Question 11

sets up equation with a constant of proportionality **M1**

k = 2 **A1**

A = 16 cao **A1**

Answer: A = 16

Question 12

(a) uses a pair of values, e.g. $12 = k*2^2$, or $48 = k*4^2$ **M1**

(a) k = 3 cao **A1**

(a) Answer: k = 3

(b) substitutes x = 6 into $y = 3x^2$ (ft their k) **M1**

(b) y = 108 cao **A1**

(b) Answer: y = 108

Question 13

(a) $k = 108/3^2$ (=12) **M1**

(a) $V = 12r^2$ oe cao **A1**

(a) Answer: $V = 12r^2$

(b) $r^2 = 320/12$ (ft, =26.67 to 2dp) **M1**

(b) r = 5.2 cm (awrt 5.2) **A1**

(b) Answer: 5.2 cm (awrt)

(c) new r = 1.5r, new $V = 12(1.5r)^2 = 12 \times 2.25r^2$ oe, showing the multiplier 2.25 **M1**

(c) 125% increase **A1**

(c) Answer: 125% increase

Question 14

identifies the new x as 1.5x oe (or 3x/2) **M1**

finds new $y = k(1.5x)^3 = 3.375kx^3$ oe (or $27kx^3/8$) **M1**

237.5% increase cao **A1**

Answer: 237.5% increase

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