Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Direct and inverse proportion

Time allowed: 40 minutes

Subject code **0580**

Mathematics

Questions from Paper 2 and Paper 4

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
You may use a calculator.

Total marks

/ 30

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

Information

- This paper has 10 questions worth 30 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 y is inversely proportional to x.
When $x = 9$, $y = 8$.

Find y when $x = 6$.

$y =$ ..... [3]

Inverse proportion Click for more variations

1	12	**3**	**M2** for $9 \times 8 = 6y$ oe OR **M1** for $y = \frac{k}{x}$ oe **M1** for $[y =]$ *their* $\frac{k}{6}$

2 x is inversely proportional to the square root of w.
When $w = 16$, $x = 3$.

Find x in terms of w.

$x =$ ..... [2]

Inverse proportion Click for more variations

2	$\frac{12}{\sqrt{w}}$ oe final answer	**2**	**M1** for $x = \frac{k}{\sqrt{w}}$ oe

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3 A ball falls d metres in t seconds.
d is directly proportional to the square of t.
The ball falls 44.1 m in 3 seconds.

(a) Find a formula for d in terms of t.

$d =$ ..... [2]

(b) Calculate the distance the ball falls in 2 seconds.

..... m [1]

(a) Direct proportion (b) Direct proportion Click for more variations

3(a)	$d = 4.9t^2$	**2**	**M1** for $d = kt^2$
3(b)	19.6	**1**	**FT** *their* 4.9×4

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4 The force of attraction, F Newtons, between two magnets is inversely proportional to the square of the distance, d cm, between the magnets.

When $d = 1.5$, $F = 48$.

(a) Find an expression for F in terms of d.

$F =$ ..... [2]

(b) When the distance between the two magnets is doubled the new force is n times the original force.

Work out the value of n.

$n =$ ..... [1]

(a) Inverse proportion (b) Inverse proportion Click for more variations

4(a)	$[F =]\frac{108}{d^2}$ final answer	**2**	**M1** for $F = \frac{k}{d^2}$ oe or better
4(b)	$[n =]\frac{1}{4}$ or 0.25	**1**	

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5 z is inversely proportional to the square of $(y-2)$.
When $y = 5$, $z = 9$.

Find z in terms of y.

$z =$ ..... [2]

Inverse proportion Click for more variations

5	$\frac{81}{(y-2)^2}$ final answer	**2**	**M1** for $z = \frac{k}{(y-2)^2}$ oe or better

6 y is inversely proportional to the square root of $(x-2)$.
When $x = 4.25$, $y = 12$.

Find x when $y = 3$.

$x =$ ..... [3]

Inverse proportion Click for more variations

6	38	**3**	**M2** for $12 \times \sqrt{4.25-2} = 3 \times \sqrt{x-2}$ OR **M1** for $y = \frac{k}{\sqrt{x-2}}$ oe **M1** for $3 = \frac{\text{their } k}{\sqrt{x-2}}$ oe

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7 y is inversely proportional to the cube root of $(x + 5)$.
When $x = 3$, $y = 12$.

Find y when $x = 22$.

$y =$ ..... [3]

Inverse proportion Click for more variations

7	8	**3**	**M1** for $y = \frac{k}{\sqrt[3]{x+5}}$ oe **M1** for substituting *their k* into $y = \frac{k}{\sqrt[3]{22+5}}$ oe OR **M2** for $12\sqrt[3]{3+5} = y\sqrt[3]{22+5}$ oe

8 w is proportional to the square root of y.
y is inversely proportional to x.
When $x = 4$, $y = 16$ and $w = 8$.

Find w in terms of x.

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$w =$ ..... [3]

Inverse proportion Click for more variations

8	$\frac{16}{\sqrt{x}}$ oe final answer	**3**	**M2** for $w = \frac{k}{\sqrt{x}}$ oe OR **M1** for $w = j\sqrt{y}$ **M1** for $y = \frac{c}{x}$

9 **(a)** y is directly proportional to $(x-1)^2$.
When $x = 4$, $y = 3$.

Find y when $x = 7$.

$y =$ ..... [3]

(b) m is inversely proportional to the square root of p.

Explain what happens to the value of m when the value of p is multiplied by 9.

..... [1]

(a) Direct proportion (b) Inverse proportion Click for more variations

9(a)	12	**3**	**M1** for $y = k(x-1)^2$ oe **M1** for $y =$ *their* $k(7-1)^2$ oe
9(b)	divided by 3 oe	**1**	

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10 y is inversely proportional to $(x+2)^2$.
w is proportional to x.

When $y = 8, x = 3.5$.
When $w = 15, x = 90$.

Find y in terms of w.

$y =$ ..... [4]

Inverse proportion Click for more variations

10	$y = \dfrac{242}{(6w+2)^2}$ oe final answer	**4**	**M3** for $\dfrac{8(3.5+2)^2}{\left(\dfrac{90}{15}w+2\right)^2}$ may be done in stages or for correct answer seen then spoiled OR **M2** for $y = \dfrac{242}{(x+2)^2}$ or **M1** for $y = \dfrac{k}{(x+2)^2}$ oe or better **B1** for $w = \dfrac{x}{6}$ oe

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