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

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Formulae: forming and changing the subject

Time allowed: 40 minutes

Subject code **0580**

Mathematics

Questions from Paper 1, Paper 2 and Paper 3

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

/ 31

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 31 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 Make p the subject of the formula $m = 9p + 32$.

$p =$ ..... [2]

Changing the subject of a formula Click for more variations

1	$p = \frac{m-32}{9}$ final answer oe	**2**	**M1** for $m - 32 = 9p$ or $\frac{m}{9} = p + \frac{32}{9}$ oe

2 $A = 4\pi r^2$

Make r the subject of this formula.

$r =$ ..... [2]

Changing the subject of a formula Click for more variations

2	$\sqrt{\frac{A}{4\pi}}$ or $\frac{1}{2}\sqrt{\frac{A}{\pi}}$ oe	**2**	**M1** for $r^2 = \frac{A}{4\pi}$ or $2r\sqrt{\pi} = \sqrt{A}$ or $4r^2 = \frac{A}{\pi}$ or $\pi r^2 = \frac{A}{4}$

3 Rearrange $2(w + h) = P$ to make w the subject.

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$w =$ ..... [2]

Changing the subject of a formula Click for more variations

3	$[w =] \frac{P}{2} - h$ or $\frac{P-2h}{2}$ final answer	**2**	**M1** for $w + h = \frac{P}{2}$ or $2w + 2h = P$

4 $A = \pi rl + \pi r^2$

Rearrange this formula to make l the subject.

$l =$ ..... [2]

Changing the subject of a formula Click for more variations

4	$\frac{A-\pi r^2}{\pi r}$ or $\frac{A}{\pi r} - r$ oe final answer	**2**	**M1** for $A - \pi r^2 = \pi rl$ or $\pi r^2 - A = -\pi rl$ or $\frac{A}{\pi r} = l + r$

5 Make w the subject of the formula.

$$t = 2 - \frac{3w}{a}$$

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

Changing the subject of a formula Click for more variations

5	$\frac{a(2-t)}{3}$ cao oe	**3**	**M1** correct re-arrangement to isolate the term in w **M1** correct multiplication by a **M1** correct division by their 3 An incorrect answer scores a maximum of **M2**

6 Rearrange the formula $c = \frac{4}{a-b}$ to make a the subject.

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Answer $a =$ ..... [3]

Changing the subject of a formula Click for more variations

6	$\frac{4+bc}{c}$ or $\frac{4}{c}+b$ cao	**3**	**M1** correct move completed **M1** second correct move completed **M1** third correct move completed

7 Make x the subject of the formula.

$$y = (x-4)^2 + 6$$

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

Changing the subject of a formula Click for more variations

7	$4 \pm \sqrt{y-6}$	**3**	**M1** for *their* 6 moved correctly **M1** for *their* √ taken correctly **M1** for *their* 4 moved correctly

8 Rearrange this formula to make m the subject.

$$P = \frac{k+m}{m}$$

..... [4]

Changing the subject when it appears twice Click for more variations

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8	$m = \frac{k}{P-1}$ final answer	**4**	**B3** for final answer $\frac{k}{P-1}$ OR **M1** for multiplying or dividing by *m* correctly **M1** for term(s) in *m* on one side correctly and terms not in *m* on the other side correctly **M1** for correctly factorising *m* with a 2-term bracket oe **M1** for correct division by *their* 2-term bracket with *m* as the subject To a maximum of **M3** for an incorrect answer

9 $T = 2\pi\sqrt{\frac{\ell}{g}}$

(a) Find T when $g = 9.8$ and $\ell = 2$.

Answer(a) $T =$ ..... [2]

(b) Make g the subject of the formula.

Answer(b) $g =$ ..... [3]

(a) Substitution (b) Changing the subject of a formula Click for more variations

9	**(a)** 2.84 **(b)** $\frac{4\pi^2 l}{T^2}$ oe	**2** **3**	**M1** correct substitution of *g* and *l* seen **M1** each correct move but third move marked on answer line

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10 $P = M(g^2 + h^2)$

(a) Find the value of P when $M = 100$, $g = 3$ and $h = 4.5$.

$P =$ ..... [2]

(b) Rearrange the formula to write g in terms of P, M and h.

$g =$ ..... [3]

(a) Substitution (b) Changing the subject of a formula Click for more variations

10(a)	2925	**2**	**M1** for $100(3^2 + 4.5^2)$ or **B1** for 29.25 seen
10(b)	$[\pm]\sqrt{\frac{P}{M} - h^2}$ or $[\pm]\sqrt{\frac{P - Mh^2}{M}}$ final answer	**3**	**M1** for correct division by M **M1** for correct re-arrangement to isolate g or g^2 **M1** for correct square root of two term expression Max **2** marks for an incorrect answer

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