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

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Linear equations

Time allowed: 1 hour

Subject code **0580**

Mathematics

Questions from Paper 1, Paper 2, Paper 3 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

/ 47

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 47 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 Solve the equation $4x - 2 = 7$.

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

Solving linear equations Click for more variations

1	2.25 oe	**2**	**M1** $4x = 7 + 2$ **OR** $x - \frac{2}{4} = \frac{7}{4}$ or better

2 The cost of hiring a bicycle, \$$C$, for y hours is given by the formula $C = 12 + 3.5y$.
Maria pays \$36.50 to hire this bicycle.

Work out the number of hours she hires the bicycle for.

..... hours [2]

Forming equations from words Click for more variations

2	7	**2**	**M1** for $36.5[0] - 12 = 3.5y$ or better

3 Anna thinks of a number, she multiplies it by 2 and then finds the square root.
The answer is 12.

What number did Anna think of?

..... [2]

Problem solving with equations Click for more variations

3	72	**2**	**M1** for 12^2 [÷ 2]

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4 Joe thinks of a number, n, trebles it, and subtracts 5.
The result is 22.

Write this as an equation in terms of n, and solve the equation.

$n =$ ..... [3]

Solving linear equations Click for more variations

4	$3n - 5 = 22$	**1**	
	9 final answer	**2**	**B2FT** their equation providing their equation is in the form $an+b=22$ where $a \neq 0$ or 1 and $b \neq 0$ or **M1FT** for $3n = 22 + 5$ or $n - \frac{5}{3} = \frac{22}{3}$

5 Solve the equation.

$$3(x + 4) = 2(4x - 1)$$

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

Solving linear equations Click for more variations

5	2.8 oe	**3**	**M2** for $12 + 2 = 8x - 3x$ or better or **M1** for $3x + 12$ or $8x - 2$

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6 A group of 12 adults and 9 children travel on a bus.

The cost of an adult ticket is $\$n$.
The cost of a child ticket is $\$(n-10)$.

The total cost of the tickets is \$277.50 .

Find the cost of one adult ticket.

\$ ..... [3]

Forming equations from words Click for more variations

6	17.5[0] cao	**3**	**M1** for $12n + 9(n - 10) = 277.50$ oe **M1** dep on *their* equation using n and $n - 10$ for simplifying *their* equation correctly to $an = b$

7 These expressions are all equal in value.

$$\frac{5x-2}{3} \qquad 10-x \qquad y+11$$

Find the value of y.

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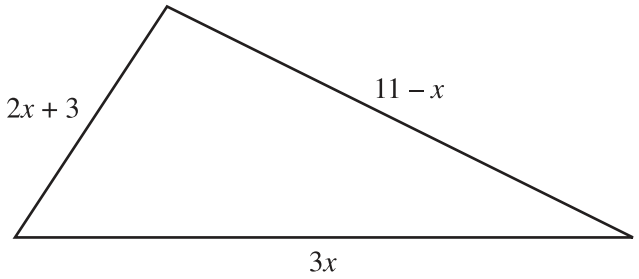
$y =$ ..... [5]

Solving linear equations Click for more variations

7	–5	**5**	**B3** for $x = 4$ or **M2** for $5x + 3x = 30 + 2$ or better or **M1** for $5x - 2 = 3(10 - x)$ or better **M1** $10 - \textit{their}\ x = y + 11$ or better or $\frac{5 \times \textit{their}\ x - 2}{3} = y + 11$ or better Alternative method: **B4** for $3y + 5y = -5 - 2 - 33$ or **B3** for $-5 - 5y - 2 = 3y + 33$ or **B2** for $\frac{5(-1 - y) - 2}{3} = y + 11$ or **B1** for $x = -1 - y$

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8 In this question all the measurements are in centimetres.



NOT TO SCALE

The diagram shows a triangle with sides of length $2x + 3$, $11 - x$ and $3x$.

(a) Explain why x must be less than 11.

Answer(a) .....

..... [1]

(b) Write down an expression, in terms of x, for the perimeter of the triangle.
Give your answer in its simplest possible form.

Answer(b) ..... [2]

(c) The perimeter of the triangle is 32 cm.

(i) Write down an equation in terms of x and solve it.

Answer(c)(i) $x =$ ..... [3]

(ii) Work out the length of the shortest side of the triangle.

Answer(c)(ii) ..... cm [2]

(a) Forming equations from shapes (b) Collecting like terms (c)(i) Forming equations from shapes (c)(ii) Forming equations from shapes Click for more variations

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8 (a)	If x is more than 11 then $11 - x$ would be negative oe	**1**	
(b)	$14 + 4x$ cao accept $2(2x + 7)$	**2**	**M1** for $2x + 3 + 11 - x + 3x$
(c) (i)	4.5 cao	**3**	**B1**ft for "their (b)" = 32 **M1**ft for collecting their like terms correctly to give simplified expression of form $ax = b$ OR **M1**ft $x = \frac{b}{a}$
(ii)	6.5	**2ft**	**M1**ft for clear attempt at substituting their (c)(i) into 2 or more sides of triangle

9 Solve.

$$\frac{1}{x+1} + \frac{9}{x+9} = 1$$

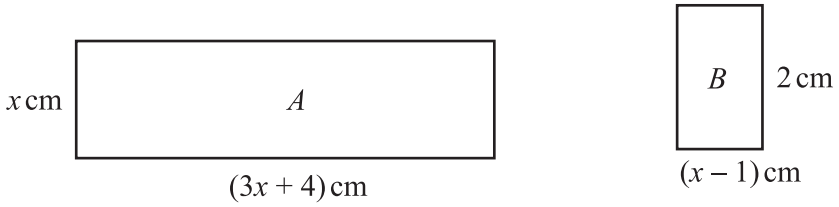
$x =$ ..... or $x =$ ..... [5]

Solving equations with algebraic fractions Click for more variations

9	$x = 3, x = -3$ nfww	**5**	**M2** for $x + 9 + 9(x + 1) = (x + 1)(x + 9)$ oe or better or **M1** for $x + 9 + 9(x + 1)$ or $(x + 1)(x + 9)$ oe or better **B1** for $x^2 + x + 9x + 9$ seen **M1 dep** for $[0 =]x^2 - 9$ oe simplified or better

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10 (a)



NOT TO SCALE

The total of the areas of rectangles A and B is $20\,\text{cm}^2$.

(i) Show that $3x^2 + 6x - 22 = 0$.

[2]

(ii) Solve the equation $3x^2 + 6x - 22 = 0$, giving your answers correct to 4 significant figures. You must show all your working.

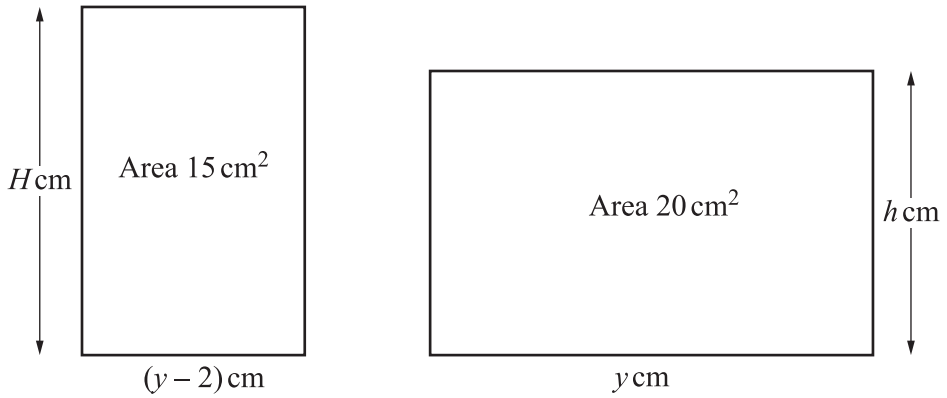
$x =$ ..... or $x =$ ..... [4]

(iii) Find the perimeter of rectangle B.

..... cm [1]

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(b)



The diagram shows two rectangles where $H - h = 1$.

By forming a quadratic equation and factorising, find the value of y.

$y =$ ..... [7]

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(a)(i) Forming equations from shapes (a)(ii) The quadratic formula (a)(iii) Problem solving with equations

(b) Solving equations with algebraic fractions Click for more variations

10(a)(i)	$x(3x+4)+2(x-1)[=20]$	**M1**	Correct expression with brackets unexpanded
	Leading to $3x^2+6x-22=0$ with no errors or omissions	**A1**	Must see equated to 20 and brackets expanded first to award A1
10(a)(ii)	$\frac{-6\pm\sqrt{6^2-4(3)(-22)}}{2.3}$ oe or for $=-1\pm\sqrt{1+\frac{22}{3}}$ oe	**B2**	**B1** for $\sqrt{6^2-4(3)(-22)}$ or $\frac{-6+\text{or}-\sqrt{k}}{2.3}$ or $(x+1)^2=k$ oe
	–3.887 and 1.887 cao	**B2**	**B1** for one correct answer or for answers –3.89 or – 3.88 or -3.886 or –3.8868 to –3.8867 and 1.88 or 1.89 or 1.886 or 1.8867 to 1.8868 or correct answers seen in working or –1.887 and 3.887 answers
10(a)(iii)	5.77 or 5.773 to 5.774	**1**	**FTdep** 2(positive x +1) evaluated to 3 sig. fig. or more, dep on $x > 1$

10(b)	$y^2+3y-40[=0]$ oe	**B4**	Oe 3 term quadratic **M3** for $15y-20(y-2)=y(y-2)$ oe Or **M2** for $\frac{15}{y-2}-\frac{20}{y}=1$ oe Or **M1** for $H(y-2)=15$ or $hy=20$ soi
	$(y+8)(y-5)$ [= 0] oe	**B2**	**Strict FT** a three term quadratic **B1FT** for $(y+a)(y+b)$ where $ab=-40$ or $a+b=3$ or y(y – 5) + 8 (y – 5) or $y(y+8)-5(y+8)$
	5	**B1**	

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