1. A straight line has equation $y = \frac{1}{2}x + 1$

The point P lies on the straight line.
P has a y-coordinate of 5.

(a) Find the x-coordinate of P.

....
(2)

(b) Write down the equation of a different straight line that is parallel to $y = \frac{1}{2}x + 1$.

....
(1)

(c) Rearrange $y = \frac{1}{2}x + 1$ to make x the subject.

....
(2)
(Total 5 marks)

2. (a) Solve $\frac{40 - x}{3} = 4 + x$

$x =$ ....

(3)

(b) Simplify fully $\frac{4x^2 - 6x}{4x^2 - 9}$

....

(3)

(Total 6 marks)

3. Solve $\dfrac{2}{x+1} + \dfrac{3}{x-1} = \dfrac{5}{x^2-1}$

x = ...
(Total 4 marks)

4. Solve $\dfrac{x-3}{5} = x - 5$

x = ………………..
(Total 3 marks)

5. Solve

$$\frac{x}{3} - 5 = 3(x - 2)$$

x = ……………………

(Total 4 marks)

6. Solve $7(x + 2) = \dfrac{5x + 1}{2}$

$x =$ ……………..

(Total 4 marks)

7. Solve $2x + 1 = \dfrac{5x}{3}$

$x =$ …………………..

(Total 2 marks)

8.

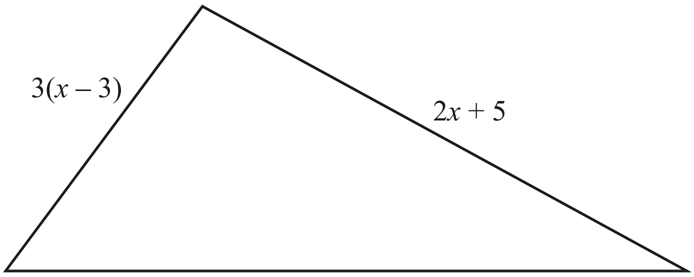

Diagram **NOT** accurately drawn

The lengths, in cm, of the sides of the triangle are $3(x – 3)$, $4x – 1$ and $2x + 5$

(a) Write down, in terms of x, an expression for the perimeter of the triangle.

.... cm

(1)

The perimeter of the triangle is 49 cm.

(b) Work out the value of x.

x = ...

(2)

(Total 3 marks)

9. Solve $5(x+8) = \dfrac{7x-4}{2}$

$x =$ ....
(Total 4 marks)

10.

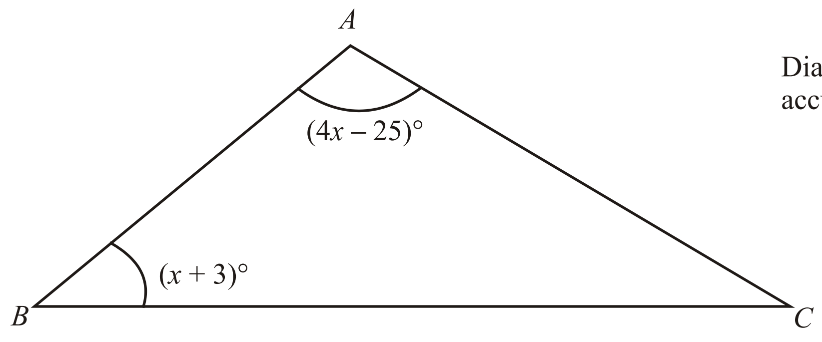

Diagram **NOT** accurately drawn

ABC is a triangle.
Angle $A = (4x - 25)°$.
Angle $B = (x + 3)°$.

The size of angle *A* is **three** times the size of angle *B*.

Work out the value of *x*.

$x =$ ....
(Total 3 marks)

11. Solve $2(x + 5) = \frac{8x - 5}{3}$

$x =$ ....
(Total 4 marks)

1. (a) 8 2

$5 = 0.5x + 1$

M1 for 5 = 0.5x + 1
A1 cao

(b) $y = \frac{1}{2}x + c$ 1

B1 for $y = \frac{1}{2}x + c$ *,* $c \neq 1$*, oe*

(c) $x = 2y - 2$ OR
$x = 2(y - 1)$ 2

M1 for correctly multiplying both sides by 2 or correctly isolating $\frac{x}{2}$

A1 for $x = 2(y - 1)$*,* $x = \frac{y-1}{0.5}$*;* $x = \frac{y-1}{\frac{1}{2}}$ *oe*

SC: B1 for $x = 2y - 1$

[5]

2. (a) 7 3

$40 - x = 3(4 + x)$
$40 - x = 12 + 3x$
$40 - 12 = x + 3x$
$4x = 28$

M1 multiplying through by 3:
$3 \times \frac{40-x}{3} = 3 \times 4 + 3 \times x$
A1 $40 - 12 = x + 3x$
A1 cao

(b) $\frac{2x}{2x+3}$ 3

$\frac{2x(2x-3)}{(2x-3)(2x+3)} = \frac{2x}{2x+3}$

B1 for $(2x - 3)(2x + 3)$
B1 for $2x(2x - 3)$ *or* $(2x + 0)(2x + 3)$
B1 cao

[6]

3. $x = 0.8$ — 4

$2(x - 1) + 3(x + 1) = 5$
$2x - 2 + 3x + 3 = 5$
$5x + 1 = 5$
$5x = 4$

M1 for attempts to multiply by a common denominator
M1 for attempting to multiply out the expression (1 numerator must be correct on LH side)
A1 for correct linear expression
A1 for 0.8 oe

[4]

4. $5\frac{1}{2}$ — 3

$x - 3 = 5x - 25$
$22 = 4x$

M1 for $x - 3 = 5(x - 5)$ *or* $\frac{x}{5} - \frac{3}{5} = x - 5$
M1 for isolating terms in x correctly from $ax + b = cx + d$
A1 cao accept $5\frac{1}{2}$, $\frac{11}{2}$, 5.5

[3]

5. $\frac{3}{8}$ oe — 4

$x - 15 = 9(x - 2)$
$x - 15 = 9x - 18$
$8x = 3$

M1 for accurate removal of the fraction
M1 for correct expansion of bracket
M1 for correct process to separate x and non x terms
A1 for $\frac{3}{8}$ *oe*

[4]

6. -3 4

$14(x + 2) = 5x + 1$
$14x + 28 = 5x + 1$
$x = -27$

M1 for eliminating the fraction correctly.
M1 (indep) for removing bracket correctly
M1 (dep on at least one M1 earned) for x terms on 1 side and constants on other
A1 cao

[4]

7. -3 2

$6x + 3 = 5x$

M1 for multiplying by 3 or $\frac{x}{3} = -1$ *or* $-\frac{x}{3} = 1$
A1 cao

[2]

8. 6 3

$3(x - 3) + 2x + 5 + 4x - 1$
$3x - 9 + 2x + 5 + 4x - 1 = 49$
$9x = 54$

B1 for $3(x - 3) + 2x + 5 + 4x - 1$ *or better* $(= 9x - 5)$
M1 ft for "$3(x - 3) + 2x + 5 + 4x - 1$" $= 49$ *ft on* $ax + b$ *from (a),* $a, b \neq 0$
A1 cao

[3]

9. -28 4

$10(x + 8) = 7x - 4$
$10x + 80 = 7x - 4$
$10x - 7x = -4 - 80$
$3x = -84$

M1 for a correct method leading to the removal of the fraction
M1 (indep) for correct expansion of brackets
M1 for correctly isolating terms (dep. on at least 4 terms to be rearranged)
A1 cao

[4]

10. $4x - 25 = 3(x + 3)$
$4x - 25 = 3x + 9$
34 3

M1 for 4x – 25 = 3(x + 3) oe
B1 for (3x + 9) or (12x – 75) or $\left(\frac{x}{3} + 1\right)$
or $\left(\frac{4x}{3} - \frac{25}{3}\right)$
A1 cao
[SC: B1 for ax + b = cx + d correctly rearranged]

[3]

11. $2x + 10 = \frac{8x - 5}{3}$
$6x + 30 = 8x - 5$
$30 + 5 = 8x - 6x$
$35 = 2x$
17.5 oe 4

M1 for correct expansion of bracket
M1 for removing fraction
M1 for isolating terms in x
A1 for 17.5 oe

[4]

1. **Paper 4**

In part (a) many candidates correctly substituted $y = 5$ into the equation but were then unable to solve this correctly. Some substituted 5 for x instead of y. Part (b) was answered poorly. Many tried to rearrange the equation or simply wrote it in a different way, e. g. $y = 0.5x + 1$. Dealing with the $\frac{1}{2}$ proved difficult in part (c) and even successful candidates tended to write $\frac{y-1}{\frac{1}{2}}$ rather than $2(y - 1)$. Few candidates rearranged the equation correctly and often no working was shown so no mark could be awarded for a correct step. Some candidates simply interchanged x and y in the equation.

Paper 6

The presence of the half as the coefficient of x caused more problems than it should have. A common answer to part (a) was 9, which was obtained by multiplying 5 by 2 and then subtracting 1. A similar process was carried out in many cases for part (c), where the answer of $x = 2y - 1$ was very common.
There were many correct answers to part (b), although some candidates thought that they had to write the same equation in an alternative fashion, giving, for example, the response $2y = x+2$.

2. Mathematics A

Part (a) is notionally grade B and many candidates were able to make a beginning. However, there were many poor attempts with common errors being $120 - 3x = 12 + 3x$ and $40 - x = 12 + 3x$, so, $28 = 2x$.
Part (b) was poorly answered with most candidates not spotting the factorisation of the denominator. Many cancelled the $4x^2$ only.

Mathematics B

Paper 17

This was very poorly answered with candidates, again, preferring to employ trial and improvement methods (which nearly always failed). Algebraic techniques were often abandoned after numerous errors would lead to unlikely solutions.
Of those candidates who understood the algebraic methods many often multiplied the equations by appropriate scale factors and then either added or subtracted their equations inaccurately.

Paper 19

Fully correct solutions were seen by about half the candidates. The majority of candidates were aware of the basic method to use to solve this question but failed to carry it out successfully. The most common error was to carry out the wrong operation at the substitution stage. Of those candidates who chose the correct operation at this stage, poor arithmetic prevented them from obtaining the correct solution.

3. Candidates also found this question demanding. 19% of candidates were able to give a fully correct solution but nearly 60% of candidates scored no marks. About 20% of candidates were able however to score the two marks awarded for multiplying by a common denominator and obtaining $2x - 2$ or $3x + 3$.

4. Specification A

This question proved to be more challenging. Most candidates knew that they had to clear out the fraction, generally by multiplying both sides by 5. Candidates who were competent generally went straight to $x - 3 = 5x - 25$ and continues with the correct rearrangement to find the solution. However, there were many candidates who made an incorrect approach, the two most common being

$$x - 3 = x - 25$$

and

$$5x - 15 = x - 5$$

Specification B

The general level of algebra was very disappointing. Only about 40% of candidates were able to score full marks. This should have been a routine question for higher level candidates. The most common error was made in multiplying the right hand side of the given equation by 5. Many candidates only multiplied one of the terms by 5 instead of both. This error then frequently left candidates without an equation to solve. The incorrect equation $5x - 15 = x - 5$ was frequently seen when candidates failed to multiply by 5 correctly to eliminate the fraction. Those candidates who multiplied by 5 correctly generally then went onto obtain the correct solution.

5. Paper 9

Although there were many candidates using Trial and Improvement methods, which usually failed, it was pleasing to see a large number attempting algebraic solutions. Expansion of $3(x - 2)$ usually gained 1 mark, but often a 2^{nd} was earned by either a correct attempt at removal of the fraction or by correctly separating algebraic and non-algebraic terms. The correct answer was rarely seen as the removal of the fraction term usually resulted in error.

Paper 10

The majority of candidates were able to score some marks on this question. The most common error occurred whilst trying to remove the fraction, candidates forgot the need to multiply every term by 5. Some careless arithmetic was seen. Disappointingly, a number of good candidates got as far as $8x = 3$ and then went on to give the answer as $\frac{8}{3}$ or 2.67.

6. This question was poorly done with very few candidates gaining full marks. Usually the correct expansion of $7(x + 2)$ was the only mark gained by many candidates. Very few were able to deal correctly with the denominator, and attempts usually resulted in $\frac{6x}{2} = 3x$ or $14(x + 2) = 10x + 2$. Many candidates attempted trial and improvement (error) methods which usually failed.

7. Paper 9

Only a few candidates started their solution by trying to remove the fraction by multiplying all terms by 3. The intention to do this gained 1 mark, if it was clear that $3 \times 2x + 1 = 3 \times 5x/3$ meant $3 \times 2x + 3 \times 1 = 3 \times 5x/3$. Working alone of $6x + 1 = 5x$ or $6x + 3 = 15x$ or $2x + 3 = 5x$ gained no marks.
14% gained 1 mark for correctly eliminating the fraction; however only 5% went on to find the correct solution.
Failure to score 1 mark was either a result of no attempt at answering the question or poor algebraic manipulative skills, often through an attempt initially at separating the terms in x from the number terms. $1 = (5x - 2x)/3$ and $2x = (5x - 1)/3$ were the more informed efforts.

Paper 10

Many candidates had problems with the algebraic fraction on the right hand side. The main errors included $6x + 3 = 15x$ and $6x + 1 = 5x$ or $15x$ which occurred when the candidate did not multiply every term by 3. Several candidates got as far as $–1x = 3$, but were then unsuccessful in producing the correct solution of $x = –3$. Candidates who used a trial and improvement method were rarely successful.

8. The majority of candidates were able to answer part (a) correctly. There were, however, a minority of candidates who multiplied out $3(x – 3)$ incorrectly without having previously written out the correct expression. Candidates should be reminded to show all their working. In part (b), a common error was to subtract 5 from 49 instead of adding it.

9. This question examined three algebraic manipulative skills and the mark scheme allowed for these to be credited independently. The most accessible mark was for the expansion of $5(x + 8)$ to give $5x + 40$ and those candidates gaining one mark only, gained it here. In dealing with the fraction, many candidates understood the need to multiply both sides of the equation by 2; unfortunately this often resulted in all of the terms, in each expression being doubled. It was common, therefore to see the equation written as $10x + 80 = 14x – 8$ for example. However, even after such errors, candidates could still be awarded the third method mark for rearranging their equation correctly. Far too often $\frac{7x-4}{2}$ became $\frac{3x}{2}$ and no more marks were then available. More than a half of the candidates failed to score any mark, often by trying to employ a trial and improvement method to solve the equation.

10. Intermediate Tier

Very few candidates used correct algebra in an attempt to solve this problem many preferring trial and improvement methods. These usually failed. It was encouraging to see some algebraic attempts and credit was given for quoting a correct equation or for a correct interpretation of 3 times an angle.

Higher Tier

Candidates found this a demanding question. Disappointingly, relatively few candidates were able to write down a correct equation from the given information. Those candidates that were able to write down a correct equation generally went on to score full marks for the question.

11. No report available.