

A12-A13...Equations with One Unknown

OCR

(b) Solve.

(i) $8a = 54$

(b)(i) $a = \dots\dots\dots$ [1]

(ii) $11c + 20 = 53$

(ii) $c = \dots\dots\dots$ [2]

(b) Solve.

(i) $8a = 54$

$$a = \frac{54}{8}$$

(b)(i) $a = 6.75$ [1]

(ii) $11c + 20 = 53$

$$c \rightarrow (\times 11) \rightarrow (+20) \rightarrow 53$$

$$3 \leftarrow (\div 11) \leftarrow (-20) \leftarrow 53$$

(ii) $c = 3$ [2]

(c) Solve.

(i) $x + 8 = 23$

(c)(i) $x = \dots\dots\dots$ [1]

(ii) $12 - x = 31$

(ii) $x = \dots\dots\dots$ [1]

(c) Solve.

(i) $x + 8 = 23$

$$x \rightarrow (+8) \rightarrow 23$$

$$\leftarrow (-8) \leftarrow 23$$

(c)(i) $x = \dots\dots\dots 15 \dots\dots\dots [1]$

(ii) $12 - x = 31$

$$12 - \boxed{-19} = 31$$

$$+ \quad \begin{array}{r} 31 \\ -12 \\ \hline \end{array}$$

(ii) $x = \dots\dots\dots -19 \dots\dots\dots [1]$

5 (a) Simplify.

(i) $t - 3t + 7t$

(a)(i) [1]

(ii) $-5x + 4y + 3x - y$

(ii) [2]

(b) Solve.

(i) $4h = 68$

(b)(i) $h =$ [1]

(ii) $94 = 4 + 7.5x$

(ii) $x = \dots\dots\dots$ [2]

(iii) $2x > 7$

(iii) $\dots\dots\dots$ [1]

(c) Factorise fully.

$$2x^2 + 4x$$

(c) $\dots\dots\dots$ [2]

5 (a) Simplify.

(i) $t - 3t + 7t$

$$-2t + 7t$$

(a)(i) $5t$ [1]

(ii) $\boxed{-5x} + 4y + \boxed{3x} - y$

(ii) $-2x + 3y$ [2]

(b) Solve.

(i) $4h = 68$

$$h = \frac{68}{4}$$

(b)(i) $h =$ 17 [1]

(ii) $94 = 4 + 7.5x$

$x \rightarrow \textcircled{\times 7.5} \rightarrow \textcircled{+4} \rightarrow 94$
 $12 \leftarrow \div 7.5 \leftarrow \textcircled{-4} \leftarrow 94$

(ii) $x = \dots\dots\dots 12 \dots\dots\dots$ [2]

(iii) $2x > 7$

$x > \frac{7}{2}$

(iii) $\dots\dots\dots x > 3.5 \dots\dots\dots$ [1]

(c) Factorise fully.

$2x^2 + 4x$
 $2x(x+2)$

(c) $\dots\dots\dots 2x(x+2) \dots\dots\dots$ [2]

5 (a) Multiply out.

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$$3x(x + 2y)$$

(a) [2]

(b) Solve.

(i) $7x = 28$

(b)(i) $x =$ [1]

(ii) $\frac{x}{3} - 2 = 9$

5 (a) Multiply out.

$$3x(x+2y)$$

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(a) $3x^2 + 6xy$ [2]

(b) Solve.

(i) $7x = 28$

$$x = \frac{28}{7}$$

(b)(i) $x = 4$ [1]

(ii) $\frac{x}{3} - 2 = 9$

$$x \rightarrow (-3) \rightarrow (-2) \rightarrow 9$$
$$33 \leftarrow (x3) \leftarrow (+2) \leftarrow 9$$

||

$$x = 33 \checkmark$$

4 Patrick writes down a number.

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He says

If I find the square root of that number and then add 15, I get 27.

What number did Patrick write down?

..... [2]

4 Patrick writes down a number.

Created by W Neill

He says

A12/13

If I find the square root of that number and then add 15, I get 27.

What number did Patrick write down?

$$? \rightarrow \sqrt{\quad} \rightarrow +15 \rightarrow 27$$

$$144 \leftarrow \text{square it} \leftarrow -15 \leftarrow 27$$

12^2 12

.....144 ✓ [2]

7 (a) Solve.

(i) $4x = 56$

(a)(i) $x = \dots\dots\dots$ [1]

(ii) $\frac{126}{x} = 7$

(ii) $x = \dots\dots\dots$ [1]

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(iii) $8x - 6 = 46$

(iii) $x = \dots\dots\dots$ **[2]**

7 (a) Solve.

A12/13

(i) $4x = 56$

$$x = \frac{56}{4} =$$

(a)(i) $x = \dots\dots\dots 14 \dots\dots\dots$ [1]

(ii) $\frac{126}{x} = 7$

$$\frac{12}{\textcircled{3}} = 4$$

$$\frac{126}{7} =$$

(ii) $x = \dots\dots\dots 18 \dots\dots\dots$ [1]

(iii) $8x - 6 = 46$

$x \rightarrow \textcircled{\times 8} \rightarrow \textcircled{-6} \rightarrow 46$

$\leftarrow \textcircled{\div 8} \leftarrow \textcircled{+6} \leftarrow 46$

52

$52 \div 8$

(iii) $x = \dots\dots\dots 6.5 \dots\dots\dots$ [2]

6 Solve.

(a) $x - 6 = 4$

A12/13

(a) $x = \dots\dots\dots$ [1]

(b) $\frac{12}{x} = 3$

A12/13

(b) $x = \dots\dots\dots$ [1]

6 Solve.

(a) $x - 6 = 4$

A12/13

$$\square - 6 = 4$$

(a) $x = \dots\dots\dots 10 \dots\dots\dots$ [1]

(b) $\frac{12}{x} = 3$

A12/13

$$12 \div \square = 3$$

(b) $x = \dots\dots\dots 4 \dots\dots\dots$ [1]

(c) Solve.

A12/13 $\frac{2x}{3} = 4$

(c) $x = \dots\dots\dots$ [2]

(c) Solve.

A12/13 $\frac{2x}{3} = 4$

$$x \rightarrow (\times 2) \rightarrow (\div 3) \rightarrow 4$$
$$6 \leftarrow (\div 2) \leftarrow (\times 3) \leftarrow 4$$

(c) $x = \overset{6}{\dots\dots\dots} \checkmark$ [2]

Edexcel

17 (a) Expand $2a(a + 7)$

.....
(1)

(b) Factorise $14b - 7$

.....
(1)

(c) Solve $9(c - 6) = 63$

(d) Simplify $3y^2 \times 4y^3$

.....
(1)

17 (a) Expand $2a(a + 7)$

$$2a^2 + 14a$$

(1)

(b) Factorise $14b - 7$

$$7(2b - 1)$$

(1)

(c) Solve $9(c - 6) = 63$

$$c \rightarrow (-6) \rightarrow (\times 9) \rightarrow 63$$

$$13 \leftarrow (\div 9) \leftarrow (+6) \leftarrow 63$$

(d) Simplify $3y^2 \times 4y^3$

$$12y^5$$

(1)

8 (a) Solve $4a = 12$

A12/13

$$a = \dots\dots\dots$$

(1)

(b) Solve $3y + 7 = 22$

A12/13

$$y = \dots\dots\dots$$

(2)

8 (a) Solve $4a = 12$

A12/13

$$a = \frac{12}{4}$$

$$a = \underline{3} \quad (1)$$

(b) Solve $3y + 7 = 22$

A12/13

$$y \rightarrow \textcircled{\times 3} \rightarrow \textcircled{+ 7} \rightarrow 22$$
$$5 \leftarrow \textcircled{- 7} \leftarrow \textcircled{\div 3} \leftarrow 22$$

$$y = \underline{5} \quad (2) \checkmark$$

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3 (a) Simplify $7 \times e \times f \times 8$

.....
(1)

(b) Solve $\frac{x}{5} = 2\frac{1}{2}$

$x =$
(1)

(Total for Question 3 is 2 marks)

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3 (a) Simplify $7 \times e \times f \times 8$

56ef
(1)

(b) Solve $\frac{x}{5} = 2\frac{1}{2}$

$$2\frac{1}{2} \times 5 =$$

$$\square \div 5 = 2\frac{1}{2}$$

$$\textcircled{12} \div 4 = 3$$

$$2\frac{1}{2} \quad 5 \quad 7\frac{1}{2} \quad 10 \quad 12\frac{1}{2}$$

$$x = \underline{12.5} \checkmark$$

(1)

(Total for Question 3 is 2 marks)

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19 (a) Solve $4(x - 5) = 18$

$x = \dots\dots\dots$
(2)

$-3 < t \leq 2$
 t is an integer.

(b) Write down all the possible values of t .

$\dots\dots\dots$
(2)

19 (a) Solve $4(x - 5) = 18$

$$x \rightarrow (-5) \rightarrow (\times 4) \rightarrow 18$$
$$\leftarrow (+5) \leftarrow (\div 4) \leftarrow 18$$

9.5 4.5

$$4 \overline{) 18.0}$$

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$$4(x-5) = 18 \quad \dots \div 4$$
$$x-5 = 4.5 \quad \dots +5$$
$$x = 9.5 \checkmark$$

$$x = \underline{9.5}$$

(2)

$-3 < t < 2$
 t is an integer. \rightarrow whole numbers

(b) Write down all the possible values of t .

~~3~~, -2, -1, 0, 1, 2

✓

(2)

3 Solve $\frac{y}{4} = 10.5$

$y = \dots\dots\dots$

(Total for Question 3 is 1 mark)

3 Solve $\frac{y}{4} = 10.5$

$$10.5 \times 4$$

$$10 \times 4 = 40$$

$$0.5 \times 4 = 2$$

$$y \div 4 = 10.5$$

$$\boxed{12} \div 4 = 3$$

$$y = \underline{\quad 42 \quad}$$

(Total for Question 3 is 1 mark)

24 (a) Solve $2x^2 = 72$

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.....
(2)

(b) Expand and simplify $(2x + 1)(3x - 2)$

.....
(2)

24 (a) Solve $2x^2 = 72$

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$$x^2 = \frac{72}{2}$$

$$x^2 = 36$$

$$\sqrt{36}$$

$$\begin{array}{r} +6 \\ -6 \\ \hline \end{array}$$

(2)

(b) Expand and simplify $(2x + 1)(3x - 2)$

x	2x	+1
3x	6x ²	+3x
-2	-4x	-2

$$6x^2 - 1x - 2$$

(2)

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(c) Solve $3(m - 4) = 21$

A12/13

$m = \dots\dots\dots$
(2)

(c) Solve $3(m - 4) = 21$

A12/13

$$m \rightarrow (-4) \rightarrow (\times 3) \rightarrow 21$$
$$\parallel \leftarrow (+4) \leftarrow (\div 3) \leftarrow 21$$

(7)

$$m = \frac{\parallel}{\parallel} \quad (2)$$

✓

11 (a) Solve $x + x + x = 51$

A12/13

$$x = \text{.....}$$

(1)

(b) Solve $\frac{y}{4} = 3$

$$y = \text{.....}$$

(1)

(c) Solve $2f + 7 = 18$

$$f = \dots\dots\dots (1)$$

11 (a) Solve $x + x + x = 51$

A12/13

$$3x = 51$$

$$x = \frac{51}{3}$$

$$x = \frac{17}{(1)}$$

(b) Solve $\frac{y}{4} = 3$

$$\frac{12}{4} = 3$$

$$\boxed{12} \div 4 = 3$$

$$y = \frac{12}{(1)}$$

(c) Solve $2f + 7 = 18$

$$f \Rightarrow \textcircled{\times 2} \Rightarrow \textcircled{+7} \Rightarrow 18$$
$$55 \leftarrow \textcircled{:2} \leftarrow \textcircled{-7} \leftarrow 18$$

"

$$f = \frac{5.5}{(1)}$$

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19 (a) Solve $3(x - 4) = 12$

A12/A13

$x = \dots\dots\dots$
(2)

19 (a) Solve $3(x - 4) = 12$

A12/A13

$$x \rightarrow (-4) \rightarrow (\times 3) \rightarrow 12$$
$$x \leftarrow (+4) \leftarrow (\div 3) \leftarrow 12$$

4

$$x = \underline{8} \quad (2)$$

$$AE = 4x$$

$$AB = 2x + 1$$

$$BC = x + 2$$

All these measurements are given in centimetres.

The perimeter of the pentagon is 18 cm.

⊞ Show that $10x + 6 = 18$

(b) Find the value of x .

A12

A13

$$x = \dots\dots\dots$$

(2)

$$AE = 4x$$

$$AB = 2x + 1$$

$$BC = x + 2$$

All these measurements are given in centimetres.

The perimeter of the pentagon is 18 cm.

Show that $10x + 6 = 18$

(b) Find the value of x .

A12

A13

$$10x + 6 = 18$$

$$x \rightarrow (\times 10) \rightarrow (+6) \rightarrow 18$$

$$1.2 \leftarrow (\div 10) \leftarrow (-6) \leftarrow 18$$

$$x = \frac{1.2}{(2)} \checkmark$$

11 (a) Solve $3x^2 = 108$

A12/A13

.....
(2)

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11 (a) Solve $3x^2 = 108$

A12/A13

$$3x^2 = 108$$

$$x^2 = \frac{108}{3}$$

$$x^2 = 36$$

$$x = \sqrt{36}$$

$$\begin{array}{r} 36 \\ 3 \overline{)108} \end{array}$$

6 and -6
(2)

Given that $n^{\frac{2}{3}} = 8$ and $n > 0$

(c) work out the value of n .

Give your answer in the form $a\sqrt{b}$ where a and b are integers.

N54

A12/13

Given that $n^{\frac{2}{3}} = 8$ and $n > 0$

(c) work out the value of n .

Give your answer in the form $a\sqrt{b}$ where a and b are integers.

N54
A12/13

$$n^{\frac{2}{3}} = 8$$

$$3\sqrt[n]{n^2} = 8$$

$$\sqrt[n]{n} = \sqrt{8}$$

$$n = \sqrt{8}^3$$

$$\rightarrow \sqrt{8} \times \sqrt{8} \times \sqrt{8}$$

$$8\sqrt{8} \checkmark$$

or

$$8(2)\sqrt{2} = 16\sqrt{2} \checkmark$$

$$\frac{8\sqrt{8}}{(2)}$$

$$\sqrt{8} \dots \frac{\sqrt{4}\sqrt{2}}{2\sqrt{2}}$$

AQA

4 Solve $x - 3 = 0$

A12
A13 Circle your answer.

[1 mark]

$x = -3$

$x = 0$

$x = \frac{1}{3}$

$x = 3$

4 Solve $x - 3 = 0$

A12
A13 Circle your answer.

[1 mark]

$x = -3$

$x = 0$

$x = \frac{1}{3}$

$x = 3$

$$\begin{array}{r} x - 3 = 0 \\ \quad +3 \quad \quad +3 \\ \hline x = 3 \end{array}$$

$$\begin{array}{r} x(-3) = 0 \\ \quad \quad \quad \rightarrow \\ x = +3 \end{array}$$

11

Solve

$$4x - 3 = 14$$

A12
A13

[2 marks]

$$x = \underline{\hspace{10em}}$$

11

Solve

$4x - 3 = 14$

A12/A13

[2 marks]

$$x \rightarrow \textcircled{\times 4} \rightarrow \textcircled{-3} \rightarrow 14$$

$$\leftarrow \textcircled{\div 4} \leftarrow \textcircled{+3} \leftarrow 14$$

17

$$x = \underline{\underline{\frac{17}{4} = 4.25}} \checkmark$$

5 (a) Solve $x - 3 = 14$

[1 mark]

A12/A13

$$x = \underline{\hspace{10em}}$$

5 (b) Solve $5y = 45$

[1 mark]

A12/A13

$$y = \underline{\hspace{10em}}$$

5 (c) Solve $8 + w = 6$

[1 mark]

A12/A13

$w =$ _____

5 (a) Solve $x - 3 = 14$

[1 mark]

A12/A13

$$x \rightarrow (-3) \rightarrow 14$$
$$17 \leftarrow (+3) \leftarrow 14$$

$$x = 17$$

5 (b) Solve $5y = 45$

[1 mark]

A12/A13

$$y \rightarrow (\times 5) \rightarrow 45$$
$$9 \leftarrow (:5) \leftarrow 45$$
$$y = 9 \checkmark$$

5 (c) Solve $8 + w = 6$

[1 mark]

A12/A13

$$w \rightarrow (+8) \rightarrow 6$$

$$w \leftarrow (-8) \leftarrow 6$$

$$w = -2 \checkmark$$

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17 Circle the equation which has the solution $x = 6$

[1 mark]

A12/13

A6

$$x - 3 = \frac{x}{2}$$

$$x = \frac{3+x}{2}$$

$$3x = 36$$

$$\frac{x}{6} = 0$$

17 Circle the equation which has the solution $x = 6$

[1 mark]

A12/13
A6

$x - 3 = \frac{x}{2}$	$x = \frac{3+x}{2}$	$3x = 36$	$\frac{x}{6} = 0$
$6 - 3 = \frac{6}{2}$	$6 = \frac{3+6}{2}$	$3 \times 6 \neq 36$	$\frac{6}{6} = 0$
$3 = 3$	$6 = 4.5$	$= 18$	$1 = 0$

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Here is a formula for the amount of water needed to cook rice.

$$w = 1.5r + 0.5$$

w is the number of cups of water needed

r is the number of cups of rice to be cooked

13 (b) How many cups of rice can be cooked with 20 cups of water?

[3 marks]

A6

A12/13

Answer _____

Here is a formula for the amount of water needed to cook rice.

$$w = 1.5r + 0.5$$

w is the number of cups of water needed

r is the number of cups of rice to be cooked

13 (b) How many cups of rice can be cooked with 20 cups of water?

[3 marks]

A6
A12/13

$$20 = 1.5(r) + 0.5$$

$$\begin{array}{l} r \rightarrow \textcircled{\times 1.5} \rightarrow \textcircled{+ 0.5} \rightarrow 20 \\ 13 \leftarrow \textcircled{\div 1.5} \leftarrow \textcircled{- 0.5} \leftarrow 20 \end{array}$$

Answer

13 ✓

2

Solve $3x = 2$

A12
A13

Circle your answer.

[1 mark]

$x = -1$

$x = \frac{2}{3}$

$x = \frac{3}{2}$

$x = 6$

2

Solve $3x = 2$

Circle your answer.

$$x = \frac{2}{3}$$

[1 mark]

A12
A13

$x = -1$

$x = \frac{2}{3}$

$x = \frac{3}{2}$

$x = 6$

22 (b) A different sequence follows the same rule.

A20 The 1st term is 4

A12/13 The 3rd term is 9.5

4 9.5

Work out the 2nd term.

[3 marks]

Answer _____

22 (b) A different sequence follows the same rule.

A20 The 1st term is 4

A12/13 The 3rd term is 9.5

4 $\frac{15}{x}$ 9.5
.....

Work out the 2nd term.

[3 marks]

$$\frac{4+x}{2} = 9.5$$

$$4+x = 19$$

$$x = 15$$

Answer

15

20

Solve $3x - 8 = 19$

[2 marks]

A12

A13

$x =$ _____

20

Solve $3x - 8 = 19$

[2 marks]

A12

A13

$$x \rightarrow \textcircled{\times 3} \rightarrow \textcircled{-8} \rightarrow 19$$

$$9 \leftarrow \textcircled{\div 3} \leftarrow \textcircled{+8} \leftarrow 19$$

27

 $x =$

9 ✓

29

$$\sqrt{6^2 + 8^2} = \sqrt[3]{125a^3}$$

N19
A12
A13

Work out the value of a .

[4 marks]

Answer _____

29

$$\sqrt{6^2 + 8^2} = \sqrt[3]{125a^3}$$

N19
A12
A13

Work out the value of a .

$$\begin{aligned} &\sqrt{6^2 + 8^2} \\ &\sqrt{36 + 64} \\ &\sqrt{100} \\ &= 10 \end{aligned}$$

$$\begin{aligned} 10 &= \sqrt[3]{125a^3} \\ 10^3 &= 125a^3 \\ 1000 &= 125a^3 \\ \frac{1000}{125} &= a^3 \\ 8 &= a^3 \\ \sqrt[3]{8} &= a \\ 2 &= a \end{aligned}$$

[4 marks]

Answer

$$a = 2 \checkmark$$

5 (a) Solve $n + 7 = 103$

[1 mark]

A12/13

$$n = \underline{\hspace{10em}}$$

5 (b) Solve $\frac{m}{6} = 12$

[1 mark]

A12/13

$$m = \underline{\hspace{10em}}$$

5 (a) Solve $n + 7 = 103$

[1 mark]

A12/13

$$n \quad 103 - 7$$

$$n = \underline{\quad 96 \quad}$$

5 (b) Solve $\frac{m}{6} = 12$

[1 mark]

A12/13

$$m \dots 12 \times 6$$

$$m = \underline{\quad 72 \quad}$$