Name ANSWERS	Class

MATHS TEACHER HUB

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Solving equations

(9 – 1) Topic booklet

Foundation

These questions have been collated from previous years GCSE Mathematics papers.

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.	Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**
- If the question is a **1F** question you are not allowed to use a calculator.
- If the question is a **2F** or a **3F** question, you may use a calculator to help you answer.

Information

- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions
Write your answers in the space provided.
You must write down all the stages in your working.

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

$10.5 \times 4 = 42$

$y =$ 42

November 2017 – Paper 1F **(Total for Question 3 is 1 mark)**

3 Solve $\frac{x}{5} = 2\frac{1}{2}$

$2.5 \times 5 =$

$x =$ 12.5

(1)

June 2017 – Paper 1F **(Total for Question 3 is 1 mark)**

5 Solve $p - 2 = 3$

$p =$ 5

June 2023 – Paper 1F **(Total for Question 5 is 1 mark)**

7 (a) Solve $f + 2f + f = 20$

$4f = 20$

$f =$ 5

(1)

(b) Solve $18 - m = 6$

$m =$ 12

(1)

Specimen 1 – Paper 3F

(Total for Question 7 is 2 marks)

8 (a) Solve $m - 3 = 4$

$m =$ 7

(1)

(b) Solve $3n + n = 24$

$4n = 28$

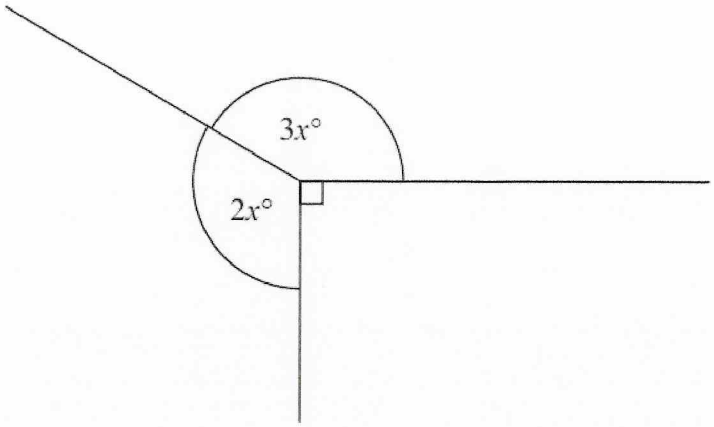
$n =$ 7

(2)

November 2022 – 1F

(Total for Question 8 is 3 marks)

9



Find the value of x.

$5x = 270$

$x = \frac{270}{5}$

$x = 54°$

June 2017 – Paper 2F

(Total for Question 9 is 3 marks)

10 (a) Solve $3m = 36$

$m =$ 12

(1)

(b) Solve $7 - x = 3$

$x =$ 4

(1)

May 2020 – Paper 2F

(Total for Question 10 is 2 marks)

10 (a) Solve $t + t + t = 12$

$t =$ 4

(1)

(b) Solve $x - 2 = 6$

$x =$ 8

(1)

(c) Solve $6w + 2 = 20$

$6w + 2 = 20$

$-2 \quad -2$

$6w = 18$

$w = 3$

$w =$ 3

(2)

June 2019 – Paper 1F **(Total for Question 10 is 4 marks)**

10 Solve $3x + 7 = 1$

$3x + 7 = 1$

$-7 \quad -7$

$3x = -6$

$x = -2$

$x =$ −2

(2)

Specimen 2 – Paper 1F **(Total for Question 10 is 2 marks)**

10 Solve $3x - 5 = 9$

$+5 \mid 3x - 5 = 9 \mid +5$

$3x = 14$

$x = \frac{14}{3}$

$x =$ 4.6̇

(2)

Sample 1 – Paper 2F

(Total for Question 10 is 2 marks)

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

$3x = 51$

$x =$ 17

(1)

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

$y =$ 12

(1)

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

$-7 \mid 2f + 7 = 18 \mid -7$

$2f = 11$

$f = \frac{11}{2}$

$f =$ 5.5

(1)

May 2018 – Paper 2F

(Total for Question 11 is 3 marks)

11 Gabriel thinks of a number.

He multiplies his number by 5 and then adds 7
His answer is 72

What number did Gabriel think of?

$x \rightarrow (\times 5) \rightarrow (+7) \rightarrow 72$

13

June 2023 – Paper 3F

(Total for Question 11 is 3 marks)

14 Solve $5(2m - 6) = 40$

$10m - 30 = 40$

$+30$ $+30$

$10m = 70$

$m = 7$

$m =$ 7

(3)

November 2022 – 2F

(Total for Question 14 is 3 marks)

14 Solve $5p + 7 = 22$

$5p + 7 = 22$

$-7 \quad -7$

$5p = 15$

$p = 3$

$p =$ 3

(2)

May 2020 – Paper 3F

(Total for Question 14 is 2 marks)

15 Solve $4x - 7 = 37$

$4x - 7 = 37$

$+7 \quad +7$

$4x = 44$

$x = 11$

$x =$ 11

(2)

November 2021 – Paper 1F

(Total for Question 15 is 2 marks)

16 Solve $\frac{x}{7} + 9 = 4$

$\frac{x}{7} + 9 = 4$

$-9 \quad -9$

$\frac{x}{7} = -5$

$\times 7 \quad \times 7$

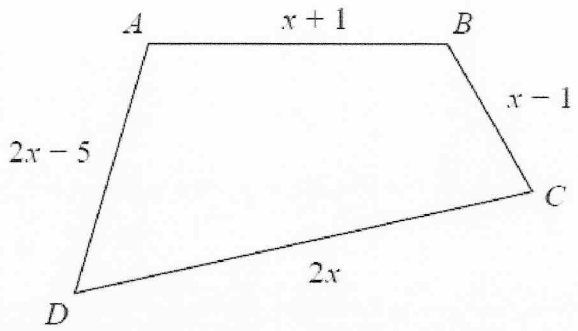
$x = -35$

$x =$ −35

November 2023 – Paper 3F

(Total for Question 16 is 2 marks)

16 Here is a quadrilateral $ABCD$.



All the measurements are in centimetres.

The perimeter of $ABCD$ is 52 centimetres.

Work out the length of DC.

$2x-5 + x+1 + x-1 + 2x = 52$

$6x - 5 = 52$

$+5 \quad +5$

$6x = 57$

$x = 9.5$

$DC = 2x$

$= 2(9.5)$

$= 19$

19 centimetres

(Total for Question 16 is 4 marks)

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

$3m - 12 = 21$

$+12 \quad +12$

$3m = 33$

$m = 11$

$m =$ 11

(2)

May 2018 – Paper 1F

(Total for Question 16 is 2 marks)

16 (a) Solve $4c + 5 = 11$

$4c + 5 = 11$

$-5 \quad -5$

$4c = 6$

$c = \frac{6}{4}$

$c =$ 1.5

(2)

(b) Solve $5(e + 7) = 20$

$5e + 35 = 20$

$-35 \quad -35$

$5e = -15$

$e = -3$

$e =$ -3

(2)

Specimen 1 – Paper 2F

(Total for Question 16 is 4 marks)

16 Solve $5x - 6 = 3(x - 1)$

$5x - 6 = 3x - 3$

$-3x$: $2x - 6 = -3$: $-3x$

$+6$: $2x = 3$: $+6$

$x = 1.5$

$x =$ 1.5

November 2017 – Paper 2F

(Total for Question 16 is 3 marks)

17 Solve $5p = 3p + 8$

$5p = 3p + 8$

$-3p$: $2p = 8$: $-3p$

$p = 4$

$p =$ 4

(2)

Specimen 2 – Paper 2F

(Total for Question 17 is 2 marks)

17 Solve $2(5x - 4) = 21$

$10x - 8 = 21$

$+8$: $10x = 29$: $+8$

$x = \frac{29}{10}$

$x =$ 2.9

(3)

November 2021 – Paper 3F

(Total for Question 17 is 3 marks)

17 Solve $\frac{3y}{4} = 12$

$3y = 48$

$y = 16$

$y =$ 16

(2)

June 2022 – Paper 3F **(Total for Question 17 is 4 marks)**

17 Solve $2(4x - 5) = 18$

$8x - 10 = 18$

$+10 \quad +10$

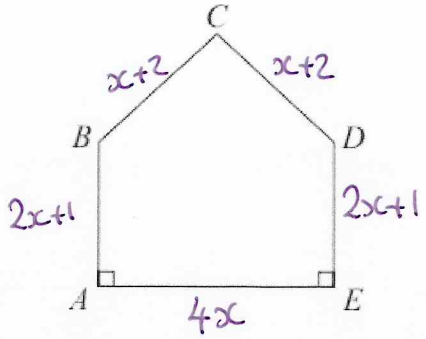
$8x = 28$

$x = \frac{28}{8} = \frac{14}{4} = \frac{7}{2} = 3.5$

$x =$ 3.5

May 2024 – Paper 1F **(Total for Question 17 is 3 marks)**

17 The diagram shows a pentagon.
The pentagon has one line of symmetry.



$AE = 4x$
$AB = 2x + 1$
$BC = x + 2$

All these measurements are given in centimetres.

The perimeter of the pentagon is 18 cm.

(a) Show that $10x + 6 = 18$

$2x+1 + x+2 + x+2 + 2x+1 + 4x = 18$

$10x + 6 = 18$

(3)

(b) Find the value of x.

$10x + 6 = 18$

$-6 \quad -6$

$10x = 12$

$x = \frac{12}{10}$

$x =$ 1.2

(2)

(Total for Question 17 is 5 marks)

18 Solve $4(2x - 3) = 20$

$8x - 12 = 20$

$+12 \quad +12$

$8x = 32$

$x = 4$

$x =$ 4

June 2023 – Paper 3F

(Total for Question 18 is 3 marks)

19 Solve $7(f - 5) = 28$

$7f - 35 = 28$

$+35 \quad +35$

$7f = 63$

$f = 9$

$f =$ 9

(2)

May 2020 – Paper 1F

(Total for Question 19 is 2 marks)

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

$3x - 12 = 12$

$+12 \quad +12$

$3x = 24$

$x = 8$

$x =$ 8

(2)

November 2018 – Paper 2F

(Total for Question 19 is 2 marks)

19 Solve $4(x - 6) = 44$

$4x - 24 = 44$

$+24 \quad +24$

$4x = 68$

$x = 17$

$x =$ 17

November 2019 – Paper 3F

(Total for Question 19 is 2 marks)

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

$+20 \mid 4x - 20 = 18 \mid +20$

$4x = 38$

$x = \frac{38}{4} = \frac{19}{2}$

$x =$ 9.5

(2)

June 2017 – Paper 1F

(Total for Question 19 is 2 marks)

19 Solve $4x + 5 = x + 26$

$-x \mid 4x + 5 = x + 26 \mid -x$

$-5 \mid 3x + 5 = 26 \mid -5$

$3x = 21$

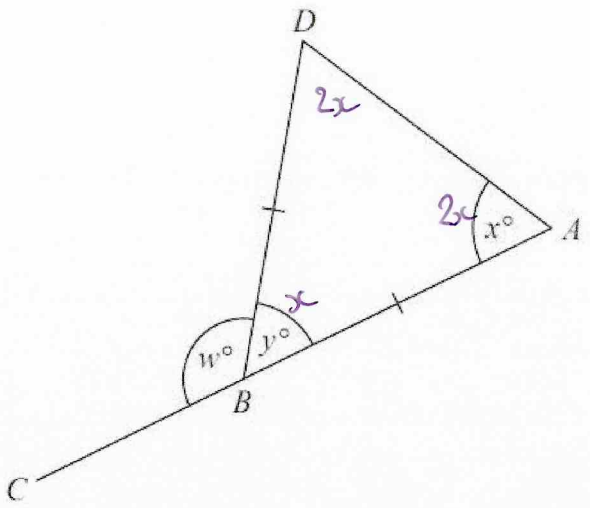
$x = 7$

$x =$ 7

Sample 1 – Paper 1F

(Total for Question 19 is 2 marks)

23 The diagram shows an isosceles triangle ABD and the straight line ABC.



$BA = BD$

$x : y = 2 : 1$

Work out the value of w.

$5x = 180$

$x = \frac{180}{5}$

$x = 36$

$$\begin{array}{r} {}^{7}\cancel{1}{}^{1}\cancel{8}0 \\ -\ 36 \\ \hline 144 \end{array}$$

$w =$ 144

November 2023 – Paper 1F

(Total for Question 23 is 4 marks)

24 Mano has three shelves of books.

There are x books on shelf **A**.
There are $(3x + 1)$ books on shelf **B**.
There are $(2x - 5)$ books on shelf **C**.

There is a total of 44 books on the three shelves.

All the books have the same mass.

The books on shelf **B** have a total mass of 7500 g.

Work out the total mass of the books on shelf **A**.

A B C

$x + (3x+1) + (2x-5) = 44$

$6x - 4 = 44$

$+4 \quad +4$

$6x = 48$

$x = 8$

A: 8 books

B: 25 books

C: 11 books

$\frac{7500}{25} = 300$g per book

A → 300g × 8 books

2400 g

(Total for Question 24 is 5 marks)

24 Solve $2x^2 = 72$

$x^2 = 36$

$x = 6$ or -6

$x = \pm 6$

(2)

November 2017 – Paper 2F

(Total for Question 24 is 2 marks)

24 Solve $x^2 + 5x - 24 = 0$

$(x + 8)(x - 3) = 0$

$x = -8$ or $+3$

June 2017 – Paper 2F

(Total for Question 24 is 3 marks)

25 Solve $5x - 14 = 52 - x$

$5x - 14 = 52 - x$ | $+x$

$+x$ | $6x - 14 = 52$ | $+14$

$+14$ | $6x = 66$

$x = 11$

$x =$ 11

November 2023 – Paper 2F

(Total for Question 25 is 3 marks)

25 Solve $\frac{5 - x}{2} = 2x - 7$

$5 - x = 2(2x - 7)$

$5 - x = 4x - 14$ | $+x$

$+x$ | $5 = 5x - 14$ | $+14$

$+14$ | $19 = 5x$

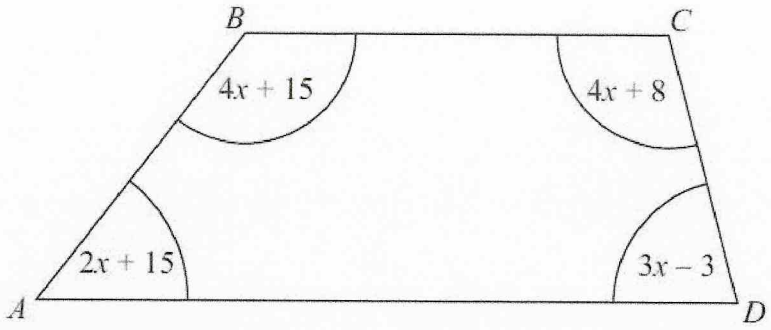
$\frac{19}{5} = x$

$x =$ 3.8

May 2018 – Paper 3F

(Total for Question 25 is 3 marks)

26 $ABCD$ is a quadrilateral.



All angles are measured in degrees.

Show that $ABCD$ is a trapezium.

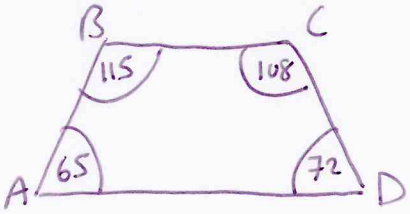
$4x+15 + 4x+8 + 3x-3 + 2x+15 = 360$

$13x + 35 = 360$

$-35 \quad -35$

$13x = 325$

$x = 25$



$ABC + BAD = 180°$

$BCD + ADC = 180$

June 2024 – Paper 2F

(Total for Question 26 is 4 marks)

27 Solve $x^2 - 7x - 18 = 0$

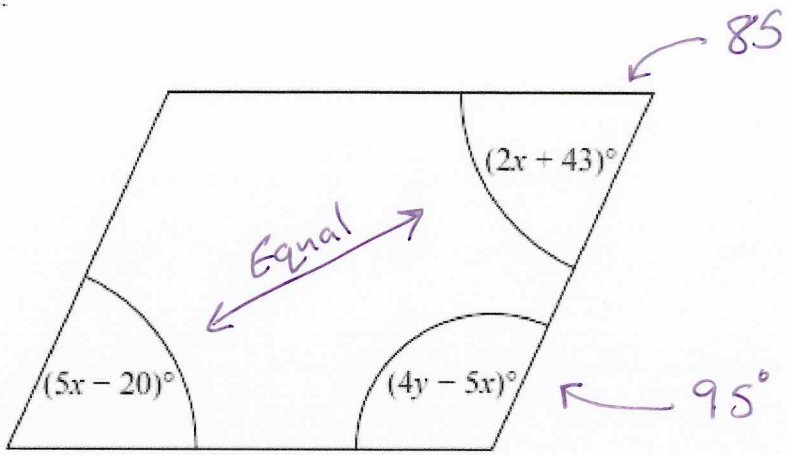
$(x-9)(x+2) = 0$

$x = +9$ or -2

November 2021 – Paper 1F

(Total for Question 27 is 3 marks)

28 Here is a parallelogram.



Work out the value of x and the value of y.

$2x + 43 = 5x - 20$

$-2x$ $\quad$ $-2x$

$43 = 3x - 20$

$+20$ $\quad$ $+20$

$63 = 3x$

$21 = x$

$4y - 5x = 95°$

$4y - 5(21) = 95°$

$4y - 105 = 95$

$+105$ $\quad$ $+105$

$4y = 200$

$y = 50$

$x =$ 21

$y =$ 50

Sample 1 – Paper 1F

(Total for Question 28 is 5 marks)