Name	Class

MATHS TEACHER HUB

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Substitution

(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.

7 $w = 4u + 3$

Find the value of w when $u = 8$

.....

November 2019 – Paper 3F **(Total for Question 7 is 2 marks)**

9 $g = 9$
$h = 4$

Work out the value of $2g + 3h$

.....

November 2018 – Paper 1F **(Total for Question 9 is 2 marks)**

10 Complete this table of values.

n	$3n + 2$
12	.....
.....	47

Specimen 1 – Paper 3F **(Total for Question 10 is 3 marks)**

10 $f = 6$
$g = 5$

Work out the value of $3f - 2g$

.....

(2)

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

11 $P = 7r + 3q$

Work out the value of P when $r = 5$ and $q = -4$

.....

June 2019 – Paper 2F **(Total for Question 11 is 2 marks)**

11 $T = 4v + 3$

Work out the value of T when $v = 2$

$T =$ .....

(2)

June 2017 – Paper 3F **(Total for Question 11 is 2 marks)**

12 $P = 2g + 4h$

(a) (i) Work out the value of P when $g = 3$ and $h = 5$

$P =$ .....

(2)

(ii) Work out the value of g when $P = 38$ and $h = 3$

$g =$ .....

(2)

$V = 3r - q$

(b) Work out the value of V when $r = -3$ and $q = 2$

$V =$ .....

(2)

November 2023 – Paper 1F **(Total for Question 12 is 6 marks)**

14 $y = 6x - 5$

Work out the value of y when $x = 4$

$y =$ .....

June 2022 – Paper 1F

(Total for Question 14 is 2 marks)

14 You can use this rule to work out the total cost, in pounds, of hiring a carpet cleaner.

Multiply the number of days by 7.8 and then add 12

Andy hires a carpet cleaner.
The total cost is £82.20

(a) Work out the number of days Andy hires the carpet cleaner for.

..... days

(2)

Chloe hires a carpet cleaner for y days.
The total cost is £T.

(b) Write down a formula for T in terms of y.

.....

(2)

Specimen 2 – Paper 3F

(Total for Question 14 is 4 marks)

15 $T = 3x + 4y$

(a) Work out the value of T when $x = 5$ and $y = -7$

.....

(2)

(b) Work out the value of y when $T = 38$ and $x = 6$

.....

(2)

May 2020 – Paper 2F **(Total for Question 15 is 4 marks)**

15 You can use this rule to work out the total hire charge, in pounds (£), for hiring a 3D printer for a number of weeks.

Total hire charge (£) = number of weeks × 70 + 50

Mia wants to hire a 3D printer for 4 weeks.

(a) Work out the total hire charge.

£.....

(2)

Zahir hires a 3D printer.
The total hire charge is £680

(b) For how many weeks does Zahir hire the 3D printer?

..... weeks

(2)

(Total for Question 15 is 4 marks)

16 $P = 4x + 3y$

$x = 5$
$y = -2$

Work out the value of P.

.....

(2)

May 2018 – Paper 1F

(Total for Question 16 is 2 marks)

16 $v = u + at$

$u = 1 \quad a = -3 \quad t = \frac{1}{2}$

Work out the value of v.

$v =$ .....

June 2017 – Paper 1F

(Total for Question 16 is 2 marks)

17 $x - 1 = 2$

Work out the value of $2x^2$

.....

November 2019 – Paper 1F **(Total for Question 17 is 3 marks)**

18 $f = 5x + 2y$
$x = 3$ and $y = -2$

Find the value of f.

.....

Sample 1 – Paper 2F **(Total for Question 18 is 2 marks)**

20 An estimate of the height, H metres, of a tall building can be found using the formula

$$H = 4f + 12$$

where the building is f floors high.

A tall building is 110 floors high.
The real height of the building is 442 m.

Seb uses the formula to find an estimate of the height of this building.
He then finds the difference between his estimate and the real height.

Show that this difference is less than 5% of the real height.

(Total for Question 20 is 4 marks)

21 $v^2 = u^2 + 2as$

$u = 12$ $a = -3$ $s = 18$

Work out a value of v.

.....

(2)

November 2018 – Paper 1F **(Total for Question 21 is 2 marks)**

22 The number of hours, H, that some machines take to make 5000 bottles is given by

$$H = \frac{72}{n}$$ where n is the number of machines.

On Monday, 6 machines made 5000 bottles.
On Tuesday, 9 machines made 5000 bottles.

The machines took more time to make the bottles on Monday than on Tuesday.

How much more time?

..... hours

June 2024 – Paper 2F **(Total for Question 22 is 2 marks)**

23 $T = 4m^2 - 11$

(a) Work out the value of T when $m = -3$

$T =$ .....

(2)

(b) Make p the subject of the formula $d = 3p + 4$

.....

(2)

June 2022 – Paper 3F **(Total for Question 23 is 4 marks)**

27 At a depth of x metres, the temperature of the water in an ocean is T°C.
At depths below 900 metres, T is inversely proportional to x.

T is given by

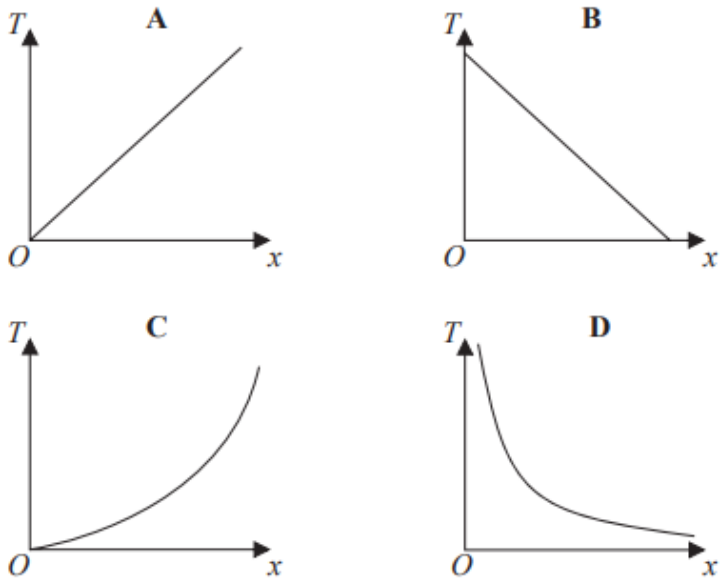
$$T = \frac{4500}{x}$$

(a) Work out the difference in the temperature of the water at a depth of 1200 metres and the temperature of the water at a depth of 2500 metres.

.....°C

(3)

Here are four graphs.



One of the graphs could show that T is inversely proportional to x.

(b) Write down the letter of this graph.

.....

(1)

(Total for Question 27 is 4 marks)

28 The number of days, d, that it will take to build a house is given by

$$d = \frac{720}{n}$$

where n is the number of workers used each day.

Ali's company will take 40 days to build the house.
Hayley's company will take 30 days to build the house.

Hayley's company will have to use more workers each day than Ali's company.

How many more?

.....

November 2019 – Paper 2F **(Total for Question 28 is 3 marks)**

29 $w = 40 - t^2$

(a) Calculate the value of w when $t = -5$

$w =$ .....

(2)

June 2024 – Paper 3F **(Total for Question 29 is 2 marks)**