Name	Class

MATHS TEACHER HUB

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Direct/inverse proportion

(9 – 1) Topic booklet

Higher

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 **1H** question you are not allowed to use a calculator.
•If the question is a **2H** or a **3H** 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.

6 A company orders a large number of plates from a factory.

It would take 30 hours to make all the plates using 4 machines.

How many machines are needed to make all the plates in 6 hours?

.....

(Total for Question 6 is 2 marks)

6 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

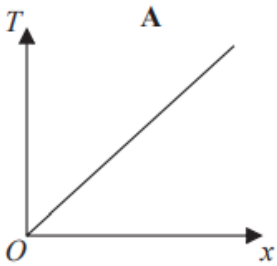
$$T = \frac{4500}{x}$$

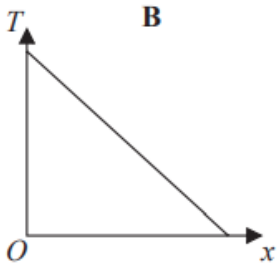
(a) Work out the difference in the temperature of the water at a depth of 1200 metres and the temperature of the water at a depth of 2500 metres.

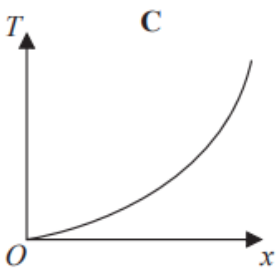
.....°C

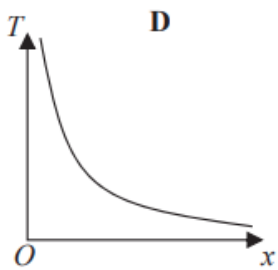
(3)

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.

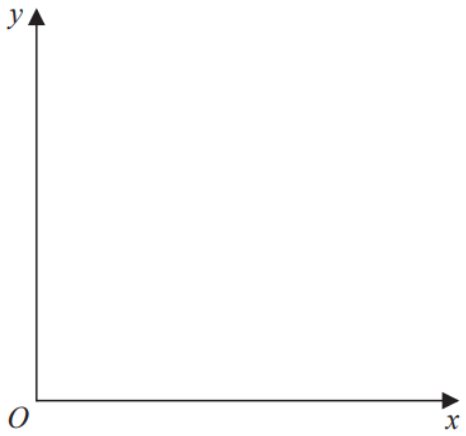
.....

(1)

(Total for Question 6 is 4 marks)

8 (a) Using the axes below, sketch a graph to represent the statement

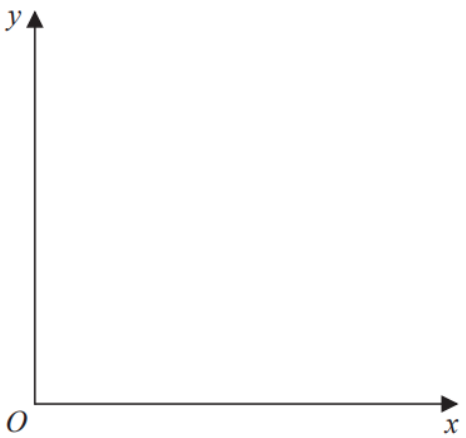
y is directly proportional to x



(1)

(b) Using the axes below, sketch a graph to represent the statement

y is inversely proportional to x



(1)

(Total for Question 8 is 2 marks)

10 y is inversely proportional to x
When $x = 1.5$, $y = 36$

Find the value of y when $x = 6$

.....

Specimen 2 – Paper 1H **(Total for Question 10 is 3 marks)**

12 f is inversely proportional to d^2

$f = 3.5$ when $d = 8$

(a) Find an equation for f in terms of d.

.....

(2)

(b) Find the positive value of d when $f = 10$
Give your answer correct to 3 significant figures.

$d =$ .....

(2)

June 2024 – Paper 2H **(Total for Question 12 is 4 marks)**

13 p is inversely proportional to t

Complete the table of values.

t	100	25		2
p	1		5	

(Total for Question 13 is 3 marks)

13 The table shows a set of values for x and y.

x	1	2	3	4
y	9	$2\frac{1}{4}$	1	$\frac{9}{16}$

y is inversely proportional to the square of x.

(a) Find an equation for y in terms of x.

.....

(2)

(b) Find the positive value of x when $y = 16$

.....

(2)

May 2017 – Paper 1H

(Total for Question 13 is 4 marks)

13 d is inversely proportional to c

When $c = 280$, $d = 25$

Find the value of d when $c = 350$

$d =$ .....

Sample 1 – Paper 2H **(Total for Question 13 is 3 marks)**

13 y is directly proportional to x.

$y = 24$ when $x = 1.5$

Work out the value of y when $x = 5$

$y =$ .....

June 2023 – Paper 1H **(Total for Question 13 is 3 marks)**

14 y is proportional to x^2
$y = 3$ when $x = 0.5$

x is inversely proportional to w
$x = 2$ when $w = 0.2$

Find the value of y when $w = 2$

$y =$ .....

November 2023 – Paper 2H

(Total for Question 14 is 5 marks)

14 y is inversely proportional to x^3

$y = 44$ when $x = a$

Show that $y = 5.5$ when $x = 2a$

November 2018 – Paper 3H

(Total for Question 14 is 3 marks)

14 y is inversely proportional to d^2
When $d = 10$, $y = 4$

d is directly proportional to x^2
When $x = 2$, $d = 24$

Find a formula for y in terms of x.
Give your answer in its simplest form.

(Total for Question 14 is 5 marks)

14 D is directly proportional to the cube of n.

Mary says that when n is doubled, the value of D is multiplied by 6

Mary is wrong.
Explain why.

.....

.....

.....

(1)

Specimen 2 – Paper 2H

(Total for Question 14 is 1 mark)

15 A pendulum of length L cm has time period T seconds.
T is directly proportional to the square root of L.

The length of the pendulum is increased by 40%.

Work out the percentage increase in the time period.

.....%

Specimen 1 – Paper 2H

(Total for Question 15 is 3 marks)

16 y is directly proportional to $\sqrt[3]{x}$

$y = 1\frac{1}{6}$ when $x = 8$

Find the value of y when $x = 64$

.....

November 2017 – Paper 1H **(Total for Question 16 is 3 marks)**

17 y is directly proportional to the square root of t.
$y = 15$ when $t = 9$

t is inversely proportional to the cube of x.
$t = 8$ when $x = 2$

Find a formula for y in terms of x.
Give your answer in its simplest form.

.....

(Total for Question 17 is 4 marks)

17 x is directly proportional to the square of y.
y is directly proportional to the cube of z.

$z = 2$ when $x = 32$

Find a formula for x in terms of z.

.....

(Total for Question 17 is 4 marks)

18 x is proportional to $\sqrt{y}$ where $y > 0$

y is increased by 44%

Work out the percentage increase in x.

.....%

November 2020 – Paper 1H **(Total for Question 18 is 3 marks)**

20 h is inversely proportional to p

p is directly proportional to $\sqrt{t}$

Given that $h = 10$ and $t = 144$ when $p = 6$
find a formula for h in terms of t

(Total for Question 20 is 4 marks)