Name	*ANSWERS*	Class	

MATHS TEACHER HUB

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Inequalities
(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.
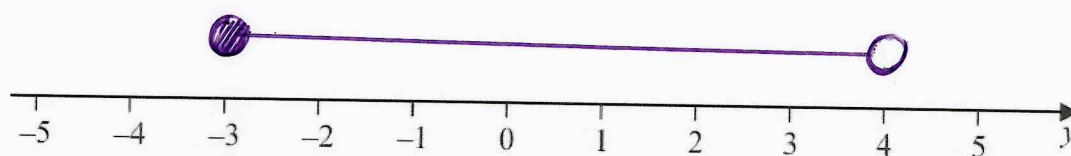**You must write down all the stages in your working.**

1 (a) Write down the inequality shown on this number line.
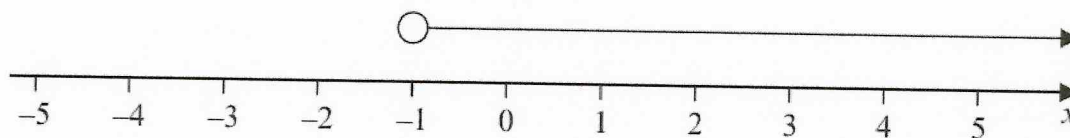
$$x > -1$$

(1)

(b) On the number line below, show the inequality $-3 \leqslant y < 4$

(2)

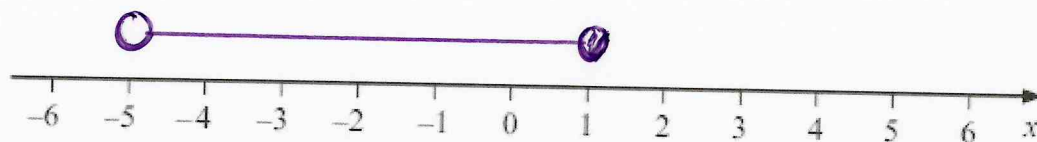**(Total for Question 1 is 3 marks)**

1 (a) Solve $14n > 11n + 6$

$$-11n \;\Big|\; \begin{array}{c} 14n > 11n + 6 \\ 3n > 6 \\ n > 2 \end{array} \;\Big|\; \begin{array}{c} -11n \\ \div 3 \end{array}$$

$\div 3$

$$n > 2$$

(2)

(b) On the number line below, show the set of values of x for which $-2 < x + 3 \leqslant 4$

$-3 \quad -3 \quad -3$

(3)

(Total for Question 1 is 5 marks)

1   Solve $\frac{5x}{2} > 7$

$$\frac{5x}{2} > 7$$

$\times 2$

$$5x > 14$$

$\div 5$

$$x > \frac{14}{5}$$

$\times 2$

$\div 5$

$$x > 2 \cdot 8$$

(2)

(Total for Question 1 is 2 marks)

1   Solve $7x - 27 < 8$

$$7x - 27 < 8$$
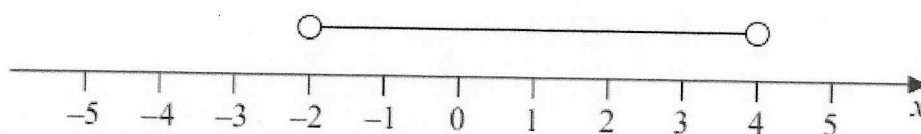
$+27$

$$7x < 35$$

$\div 7$

$$x < 5$$

$+27$

$\div 7$

$$x < 5$$

(Total for Question 1 is 2 marks)

4

4   Jenna is asked to show the inequality $-3 < x \leqslant 4$ on a number line.

Here is her answer.

(a) Write down two mistakes Jenna has made.

1 .... Plotted -2 instead of -3 ....

2 .... Circle at 4 should be coloured in. ....

....

(2)

(b) Work out the greatest integer that satisfies the inequality

$$5y - 7 < 16$$

$+7$ $5y < 23$ $+7$

$\div 5$ $y < \dfrac{23}{5}$ $\div 5$

$y < 4.6$

(2)

(Total for Question 4 is 4 marks)

4 $-2 \leqslant n < 5$
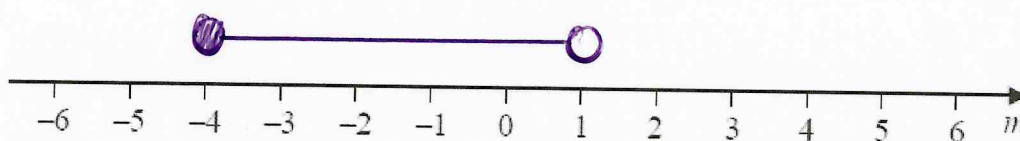
n is an integer.

(a) Write down the greatest possible value of n.

4

(b) On the number line below, show the inequality $-4 \leqslant m < 1$

(2)

(c) Solve $\dfrac{2}{5}g - 4 < 6$

$+4$ $\Bigg\vert$ $\dfrac{2}{5}g - 4 < 6$ $\Bigg\vert$ $+4$

$\times 5$ $\qquad$ $\dfrac{2}{5}g < 10$ $\qquad$ $\times 5$

$\div 2$ $\qquad$ $2g < 50$ $\qquad$ $\div 2$

$\qquad\qquad g < 25$

$g < 25$

(3)

(Total for Question 4 is 6 marks)

9 (a) Solve $6x + 4 > x + 17$

$-x$ | $5x + 4 > +17$ | $-x$
-4 | $5x > 13$ | -4
$\div 5$ | $x > \frac{13}{5}$ | $\div 5$

$x > 2.6$

(2)

(b) n is an integer with $-5 < 2n \leqslant 6$

$\div 2 \qquad \div 2$

Write down all the values of n

$-25 < n \leqslant 3$

$-2, -1, 0, 1, 2, 3$

(2)

(Total for Question 9 is 4 marks)

11 x and y are integers such that

$3 < x < 8$
$4 < y < 10$
and $x + y = 14$

Find all the possible values of x.

$x = 4, 5, 6, 7$

$y = 5, 6, 7, 8, 9,$

$x + y = 14$
$5 + 9 = 14$
$6 + 8 = 14$
$7 + 7 = 14$

$x = 5, 6, 7,$

(Total for Question 11 is 2 marks)

18 Solve $(1-x)^2 < \dfrac{9}{25}$

$(1-x) < \sqrt{\dfrac{9}{25}}$
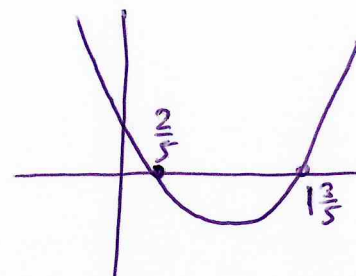
$1-x < \pm \dfrac{3}{5}$

$1-x < \dfrac{3}{5}$ $1-x < -\dfrac{3}{5}$

$1-\dfrac{3}{5} < x$ $1+\dfrac{3}{5} < x$

$\boxed{\dfrac{2}{5} < x}$ $\boxed{1\dfrac{3}{5} < x}$
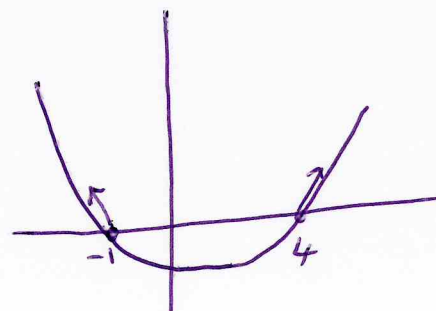
$\dfrac{2}{5} < x < 1\dfrac{3}{5}$

(3)

(Total for Question 18 is 3 marks)

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19 Solve $x^2 > 3x + 4$

$x^2 - 3x - 4 > 0$

$(x-4)(x+1) > 0$

$x > 4$ $x > -1$

$x < -1$ or $x > 4$

(Total for Question 19 is 3 marks)

19 Solve $22 < \dfrac{m^2 + 7}{4} < 32$

Show all your working.

$$22 < \frac{m^2 + 7}{4} < 32$$

$\times 4$

$\times 4$

$$88 < m^2 + 7 < 128$$

-7

-7

$$81 < m^2 < 121$$

$\sqrt{}$

$\sqrt{}$

$$\pm 9 < m^2 < \pm 11$$

$$-11 < m < -9$$
$$\text{and}$$
$$9 < m < 11$$

(Total for Question 19 is 5 marks)

20 n is an integer such that $3n + 2 \leqslant 14$ and $\dfrac{6n}{n^2 + 5} > 1$

Find all the possible values of n.

$$3n + 2 \leqslant 14$$
$$3n \leqslant 12$$
$$n \leqslant 4$$

$$\frac{6n}{n^2+5} > 1$$
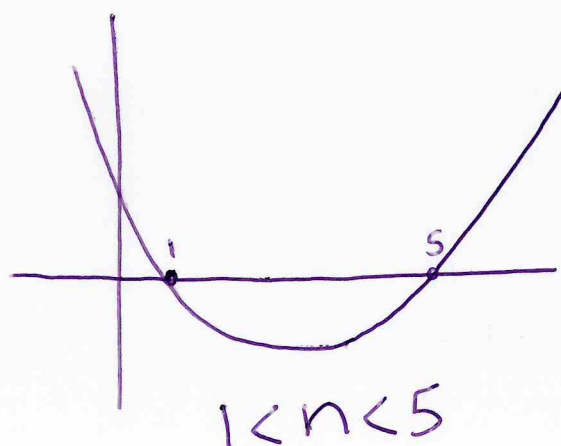$$6n > n^2+5$$
$$0 > n^2 - 6n + 5$$
$$0 > (n-5)(n-1)$$

$\boxed{5 > n}$ $\boxed{1 > n}$

$$1 < n < 5$$

For both inequalities

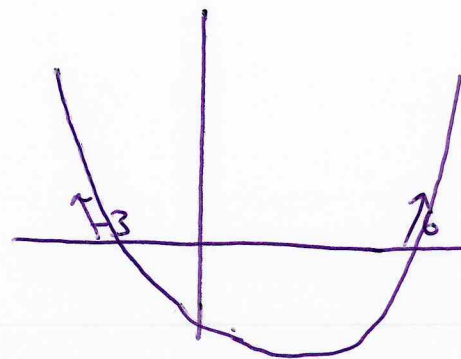$$1 < n \leqslant 4$$
$$2, 3, 4$$

21 Solve the inequality $x^2 > 3(x + 6)$

$$x^2 > 3x + 18$$

$$x^2 - 3x - 18 > 0$$

$$(x - 6)(x + 3) > 0$$

$$\underline{x > 6} \qquad \underline{x > -3}$$

$$x < -3 \qquad x > 6$$

(Total for Question 21 is 4 marks)

24 Find the set of possible values of x for which

$$4x^2 - 25 < 0 \quad \text{and} \quad 12 - 5x - 3x^2 > 0$$
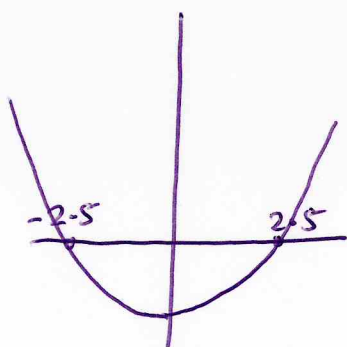
You must show all your working.

$$4x^2 - 25 < 0$$

$$4x^2 < 25$$

$$x^2 < \frac{25}{4}$$

$$x < \pm\sqrt{\frac{25}{4}}$$

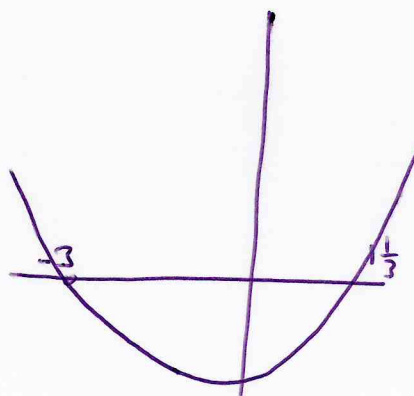$$x < \pm\frac{5}{2}$$

$$-2.5 < x < 2.5$$

$$12 - 5x - 3x^2 > 0$$

$$3x^2 + 5x - 12 < 0$$

$$(3x - 4)(x + 3) < 0$$

$$x < \frac{4}{3} \qquad x < -3$$

$$-3 < x < \frac{4}{3}$$

$$-2.5 < x < \frac{4}{3}$$

(Total for Question 24 is 5 marks)