Do NOT open this paper until instructed to do so. **While you are waiting to start write your name in the box directly below.**
Name _____ Set _____

SHREWSBURY SCHOOL

MATHEMATICS PRACTICE PAPER

May 2021

75 minutes

Third Form ~Year 9

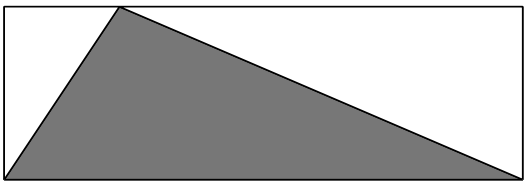
- ◇ There are 100 marks available in this paper.
- ◇ You should attempt as many questions as you can.
- ◇ At the end of the paper there is one bonus question, worth no marks.
- ◇ You must show full working where appropriate in order to gain full marks.
- ◇ You are expected to use a calculator in this paper.

1) A rectangle of card measures 12.8 cm by 7.9 cm.

(a) What is the **AREA** (shown shaded) of the rectangle ?
Give your answer accurate to 3 significant figures.

_____ **[2]**

A triangle is cut out of the card.
It has a base of 12.8 cm and a perpendicular height of 7.9 cm.



(b) What is the **AREA** (shown shaded) of the triangle ?
Give your answer accurate to 3 significant figures.

_____ **[2]**

(c) What is the **PERIMETER** of the original rectangle of card ?
Give your answer accurate to 3 significant figures.

_____ **[2]**

(d) Will the triangle have a **PERIMETER** that is ***more*** than the perimeter of the rectangle ?
Explain your answer.

_____ **[2]**

2) In a labratory, 400 beefburgers are tested for horse DNA.
The tests show that 24 of the beefburgers contain horse DNA .
What percentage of the beefburgers tested contain horse DNA ?

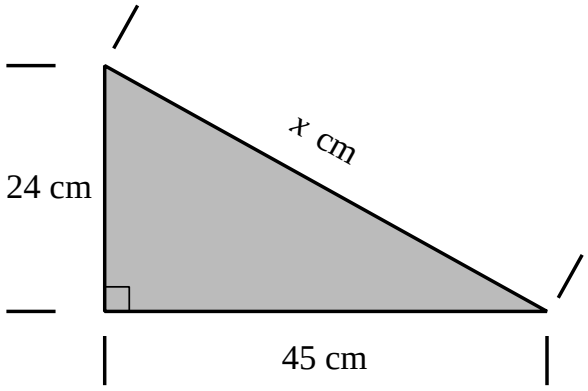
_____ **[2]**

3) In each case, determine the value of x giving the answers to 3 significant figures;

(a) $\sin x = 0.643$ **(b)** $23 \times \tan x = 17$

_____ **[2]** _____ **[2]**

4) A right angled triangle has shorter sides of lengths 24 cm and 45 cm.
The length of its hypotenuse, x cm, is not known.



Determine the length, x cm, of the hypotenuse.

_____ **[3]**

5) On average I spell 95% of words correctly.
How many spelling mistakes am I likely to make in a 2500 word essay ?

_____ **[2]**

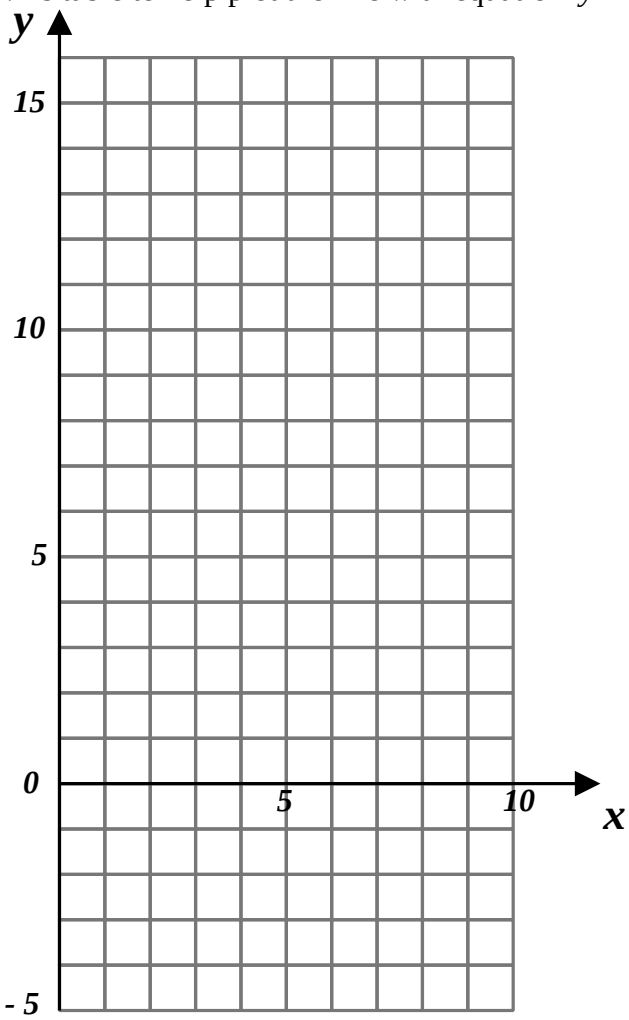
6) Nevil wishes to plot the graph of the equation $y = 0.5x + 3$
He begins by making a table, and he has just worked out that when x is 10, y is 8

(a) Complete Nevil's table;

x	0	2	5	10
$y = 0.5x + 3$				8

[2]

(b) Use Nevil's table to help plot the line with equation $y = 0.5x + 3$



[2]

(c) Write the equation of the line next to it on the graph.

[0]

(d) Will the point (68, 37) be on the line with equation $y = 0.5x + 3$?
Justify your answer.

[2]

7) Factorise the following;

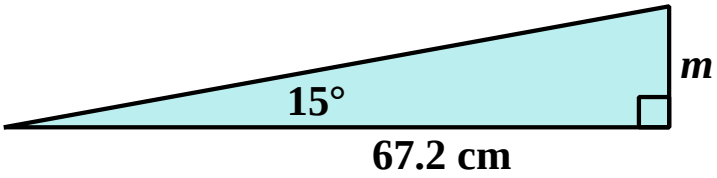
(a) $x^2 + 9x + 20$

_____ **[2]**

(b) $x^2 + 10x - 24$

_____ **[2]**

8)



(a) Label the triangle sides *hyp*, *opp*, and *adj*.

[1]

(b) Calculate the length *m*.
Give your answer correct to 3 significant figures.

_____ **[3]**

9)

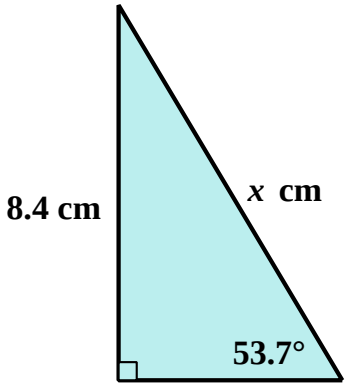


Diagram **NOT** accurately drawn

Work out the value of *x*.
Show working.
Give your answer to 3 significant figures.

_____ **[4]**

10) Here is a reminder of what the generalised quadratic equation looks like,

$$a\,x^2 + bx + c = 0$$

x is a variable, and a, b and c are constants.

This has solutions given by the following formulae

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

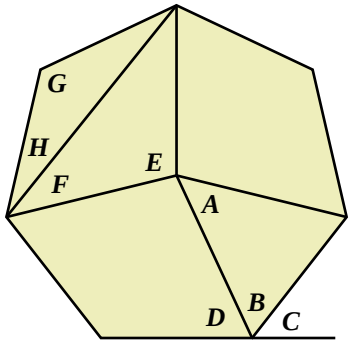
Show how you would use this formula to solve the following quadratic equation

$$x^2 + 3x + 1 = 0$$

Show ***every*** step of the working.
Give your final answers to 3 decimal places.

_____ **[5]**

11)



The diagram is of a regular septagon.

(a) How many sides has a septagon ?

_____ **[1]**

(b) Calculate the exterior angle of a septagon.

_____ **[1]**

(c) Calculate the interior angle of a septagon.

_____ **[1]**

(d) State the size of the following angles;

(i) *A*

_____ **[1]**

(ii) *B*

_____ **[1]**

(iii) *C*

_____ **[1]**

(iv) *D*

_____ **[1]**

(v) *E*

_____ **[1]**

(vi) *F*

_____ **[1]**

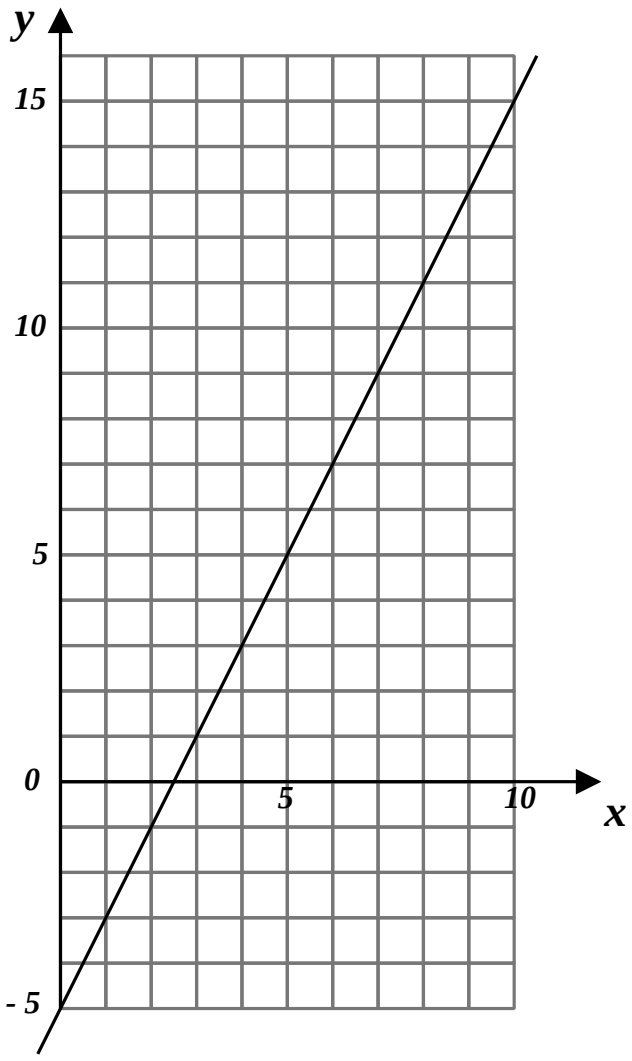
(v) *G*

_____ **[1]**

(vi) *H*

_____ **[1]**

12) Nevil has been drawing more graphs.



Alas, Nevil has forgotten to put the equation next to the line.

(a) What is the gradient of the line ?

[2]

(b) What is the equation of the line ?

_____ **[2]**

(c) Add a second line to the graph that has a gradient of $-\frac{2}{3}$

[2]

13) Simplify the following expressions by collecting together as many terms as possible.

(a) $6 - 5x + 2x + 2$

_____ **[2]**

(b) $4x - 7 + 2(3 - 2x)$

_____ **[2]**

(c) $5x^2 - 7 + 4x - 3x^2$

_____ **[2]**

(d) $7 - (3 - 2x) + 6x$

_____ **[2]**

14) An estate agent charges 2% commission on every house she sells.

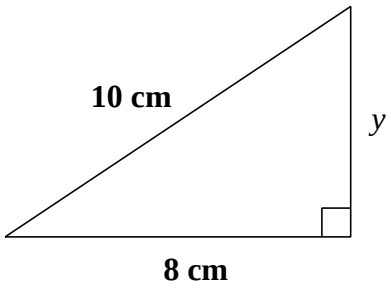
(a) How much commission will she earn on a house that she sells for £340 000 ?

_____ **[2]**

(b) The estate agent has sold a house for which she received £16 800 commission. What was the cost of the house ?

_____ **[2]**

15) A right angled triangle is shown below;



(a) Are you expecting the side marked *y* to be more or less than 10 cm ?

_____ **[1]**

(b) Calculate the length marked *y*.
Be sure to show clear working.

_____ **[4]**

16) Use your calculator to work out;

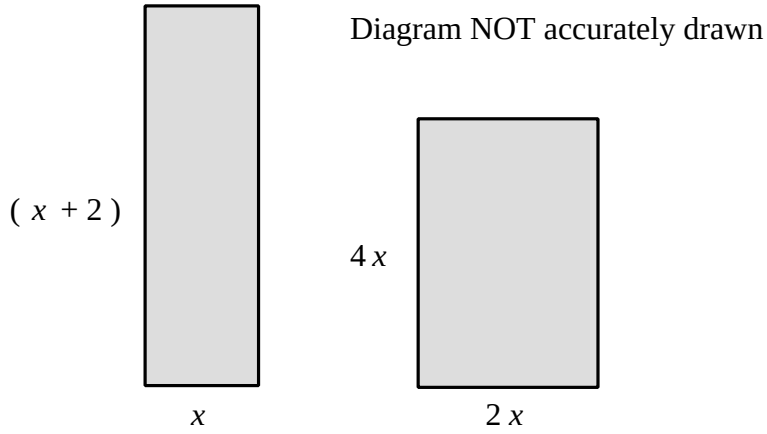
$$\left(\frac{9^2 - \sqrt{5}}{\left(2\frac{2}{3}\right)^2 - (\sqrt{7})^2} \right)^2$$

Give your answer to the nearest integer.

_____ **[3]**

17) *GCSE Examination Question from January 2013, 3H, Q2 (edited)*

Rectangle **A** has a width of x metres and a height of $(x + 2)$ metres.
Rectangle **B** has a width of $2x$ metres and a height of $4x$ metres.



(a) Use this information to write down an expression for the perimeter of rectangle **A**.

_____ **[1]**

The perimeter of rectangle **A** is equal to the perimeter of rectangle **B**.

(b) Use this information to write down an equation in x.

_____ **[2]**

(c) Find the value of x.

_____ **[3]**

18) A workman arrives with a 5m long ladder to do some restoration work on the Pub "Ye Famous Ole Ruin".
The safety instructions say that the ladder should be placed at an angle of 70° to the horizontal which the workman does as illustrated below.

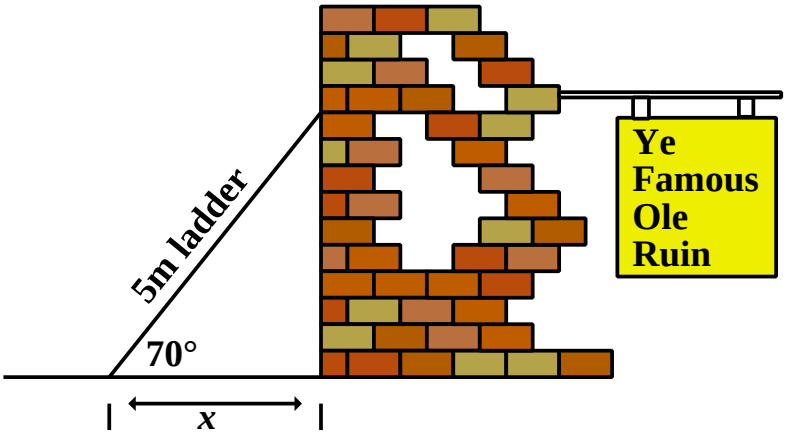


DIAGRAM NOT TO SCALE

Use trigonometry to determine, *x*, the distance between the base of the ruin wall and the foot of the ladder.

_____ **[4]**

19) Factorise first, then solve the following quadratic equations;

(a) $x^2 + 13x + 22 = 0$

_____ **[3]**

(b) $x^2 + x - 20 = 0$

_____ **[3]**

(c) $3x^2 - x - 2 = 0$

_____ **[3]**

20) After a 20% increase in price, an antique painting costs £504.
What did the painting cost before the price increase ?

_____ **[2]**

ALMOST THE END

Before turning over for the bonus question, worth no marks, check all previous answers.

THIS IS THE BONUS QUESTION

It's worth no marks

Only attempt this question if you have done (and checked!) as many of the other questions as you can

An *n*-digit number is said to be self-reproducing if, when squared, the last *n*-digits are the same.

For example, 76 is self reproducing because $76^2 = 57\mathbf{76}$

Find as many self-reproducing numbers as you can.

[0]