CITY OF LONDON FREEMEN'S SCHOOL

SAMPLE ENTRANCE EXAMINATION PAPER

For pupils currently in Year 9

MATHEMATICS

Time: 1 hour 20 minutes

Instructions

A calculator may be used throughout the examination.

Attempt ALL the questions. Show all your workings.

1.	Match the questions to the correct answers.

The answers are written correct to two decimal places.

1.	$\dfrac{2{\cdot}7 - 0{\cdot}46}{0{\cdot}3}$		$1{\cdot}17$	**A.**
2.	$2{\cdot}7 - \dfrac{0{\cdot}46}{0{\cdot}3}$		$7{\cdot}47$	**B.**
3.	$2{\cdot}7 \div (0{\cdot}46 - 0{\cdot}3)$		$5{\cdot}57$	**C.**
4.	$(2{\cdot}7 \div 0{\cdot}46) - 0{\cdot}3$		$16{\cdot}88$	**D.**

2.	Use your calculator to solve problems a], b] and c], showing all necessary steps in your working.

a]	Calculate the average speed in miles per hour of a journey of 36 miles which took 45 minutes.

Answer	_____

b]	A restaurant bill is £36 + Value-Added Tax at 17.5%.
Calculate the total bill after tax.

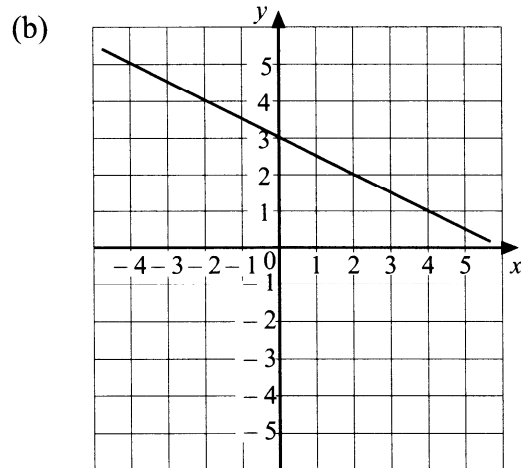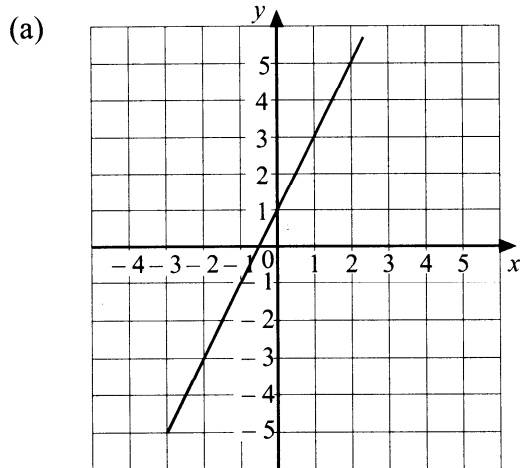Answer	_____

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2.
$$\frac{10.21 + 29.75}{0.2 \times 45}$$

Show how you would **ESTIMATE** the answer, without using a calculator.
Write down your estimate. Then **CALCULATE** the answer.

Estimate _____

Answer _____

3. Determine the equation of each of the following lines:

(a)

(b)

(a) = _____

(b) = _____

4. a]

Leaded petrol	52.4p per litre
Unleaded petrol	49.6p per litre

I filled the petrol tank of my car with unleaded petrol. It cost me £18.60.

[i]   How many litres did I buy?

Answer   _____

[ii]   How much more would it have cost me if I had bought leaded petrol
        instead?

Answer   _____

b]   Last year the amounts I spent on road tax, car insurance and petrol were
       in the ratio 1 : 3 : 7.

       I spent a total of £1430 on these three items.

       Calculate how much I spent on petrol.

Answer   _____

5. a] Solve the equation

$$4y - 1 = 9 - y$$

y = _____

b] Solve the equation

$$\frac{1}{2}x + 3 = 2$$

x = _____

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6.   Dawn did a survey to find out where the members of Green Hills High School spent their main holiday last summer.

Her results are shown in the table below.

Destination	Boys	Girls	Staff	Total
Britain	107	120	20	247
France	48	40	....	97
Greece	....	36	3	....
Rest of Europe	10	12	3	25
Other	10	6	5	....
Total	200	....	40	454

a]   Complete the table.

b]   How many girls went to France and Greece?

                                                    Ans.   _____

c]   What percentage of the staff went to Greece?

                                                    Ans.   _____%

7. a] Write each of the following numbers as a product of its prime factors:

78,   240,   420

Answers   78 = _____

240 = _____

420 = _____

b] Find the Highest Common Factor (HCF) of 78 and 240.

Answer   HCF = _____

c] Find the Lowest Common Multiple (LCM) of 240 and 420.

Answer   LCM = _____

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8.   a]   Write down the first five terms of the sequence with n^{th} term $= \frac{1}{2} n^2$.

            Answer   _____

      b]   Write an expression for the nth term of the following sequence:

                      3, 5, 7, 9, 11

            Answer n^{th} term $=$ _____

9.   Simplify the following expressions as far as possible:

      a] $3a^2 + 5a^2 =$ _____

      b] $5y^4 \times 8y^7 =$ _____

      c] $4x^5 \div x^2 =$ _____

      d] $\left(a^2\right)^4 \ =$ _____

10.   If n can only take whole number values, find the set of values of n which satisfy the inequality

                      $-3 < n \le 3$

      Answer $n =$_____

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11. Using a method of trial and improvement, find a solution to the following equation correct to 2 decimal places:

$x^2 - x = 10$ (Use x = 3 as your first guess and show all your working)

Answer   _____

12. Solve the following pair of simultaneous equations:
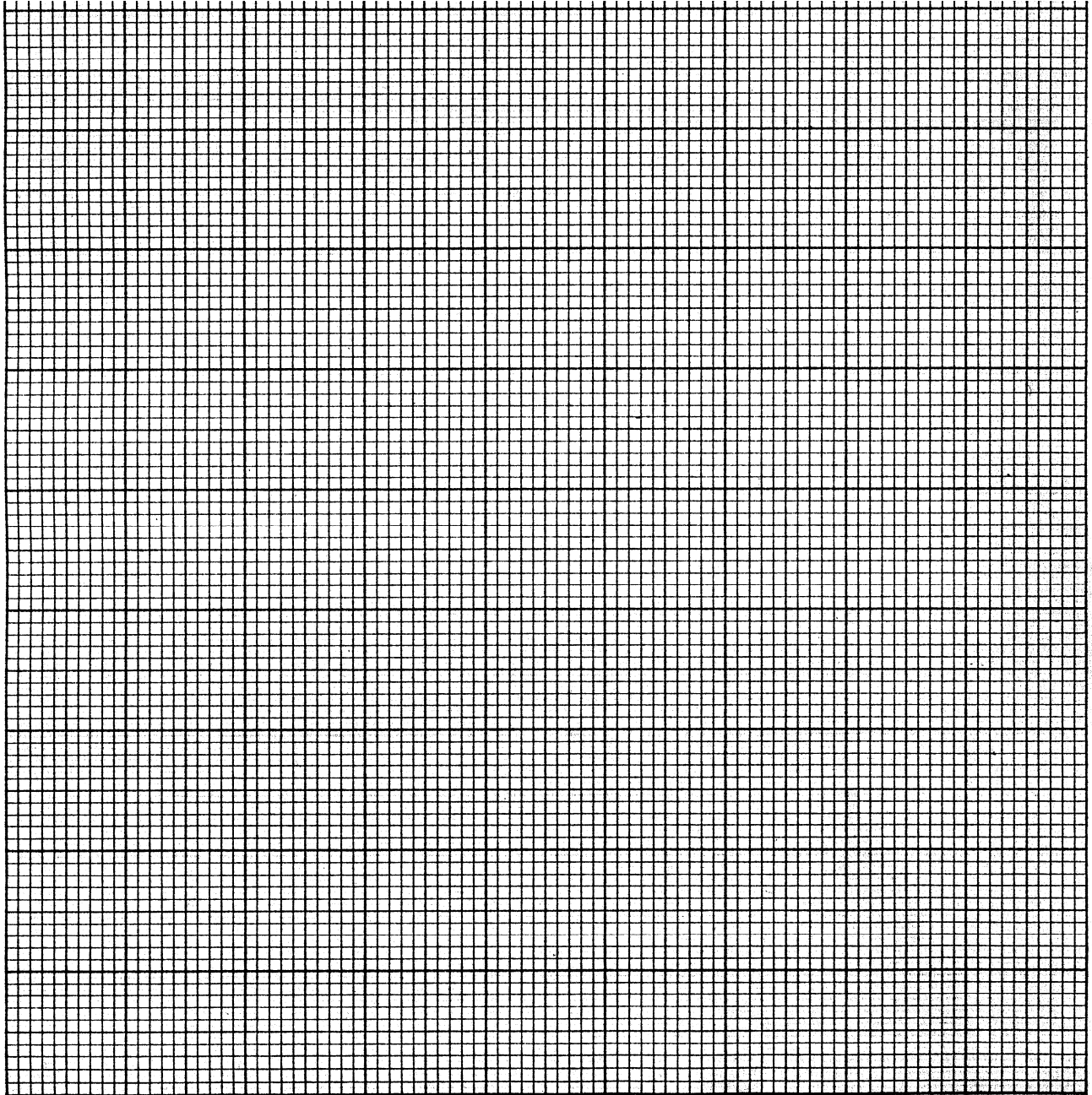
$a + 2b = 9$
$3a + b = 7$

Answers   a = _____

b = _____

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13.   a]   Draw a straight line graph on the grid below to convert temperatures
           between degrees Fahrenheit and degrees Celsius, given that:

$$0°C = 32°F \text{ and } 100°C = 212°F$$

      b]   Use your graph to complete the following conversions:

           $60°C =$ _____ $°F$; $170°F =$ _____ $°C$

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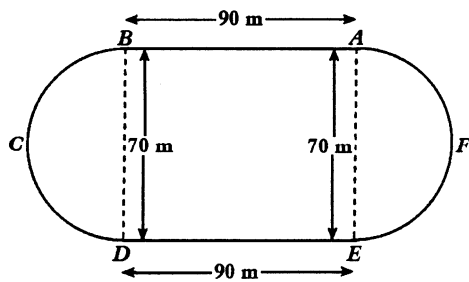
14.

Scale 1cm represents 2m
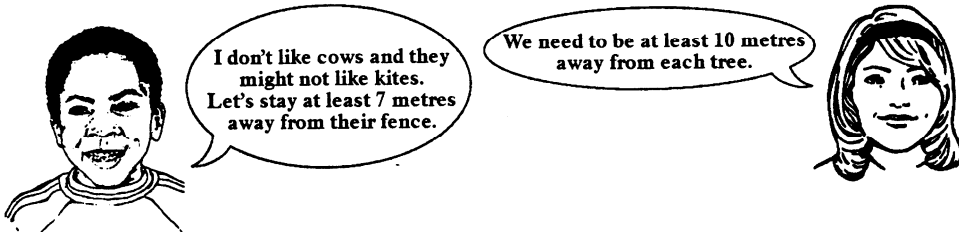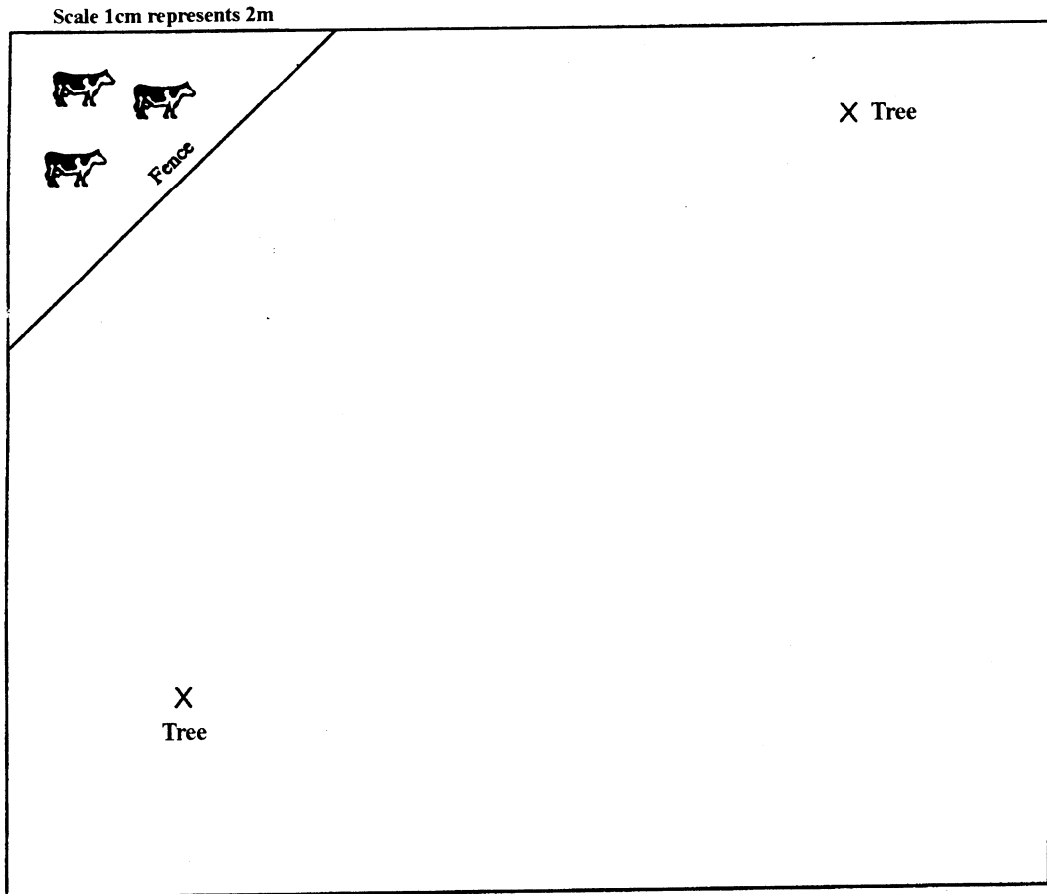
Shade on the diagram the area where they could stand to fly their kite.

15. Calculate the length of the side marked with a letter in each triangle, showing all your working.

a]

4cm

x   6cm

b]

12cm   13cm

y
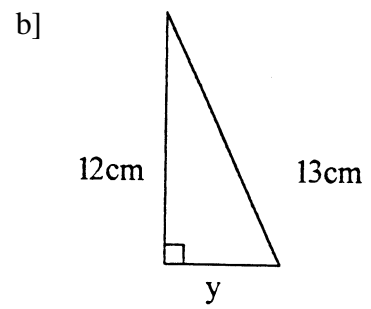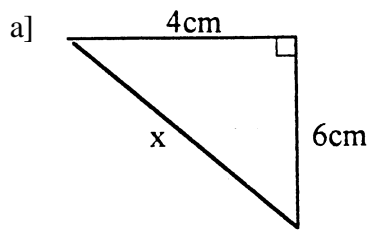
Answers   a] x = _____   b] y = _____

16.

The diagram shows a running track.

BA and DE are parallel and straight.

They are each of length 90 metres.

BCD and EFA are semi-circular.

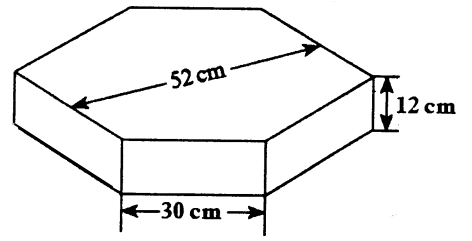They each have a diameter of length 70 metres.

a]   Calculate the perimeter of the track.

Answer   _____

b]   Calculate the total area inside the track.
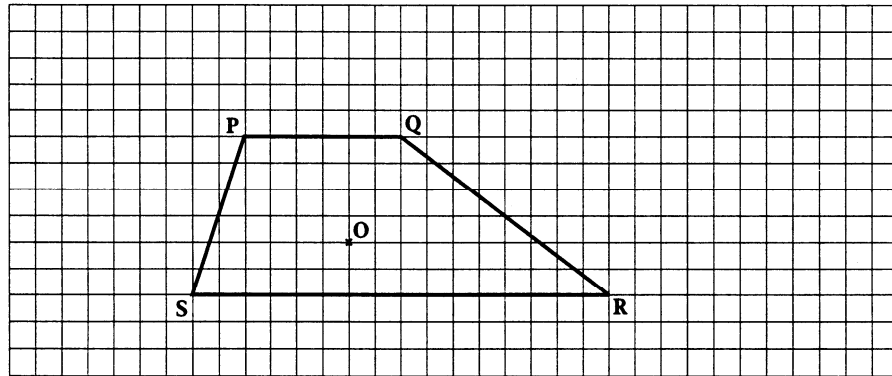
Answer   _____

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16.   c]   Josie designs a possible box for a kite.

The box is a closed regular hexagonal prism.

Use the dimensions given to calculate the
volume of this box.

52 cm

12 cm

30 cm

Answer   _____

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17.

On the grid, enlarge the trapezium PQRS using a scale factor of ½.
Use the point O as the centre of the enlargement.

18.   The examination marks of 250 pupils are recorded below. What was the
mean mark?

Class interval	0 - 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 -79	80 - 89	90 - 99
Frequency f	0	2	6	24	36	47	55	40	27	13
Mid Point x										
f x x										

Answer   Mean mark = _____

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19. The table below shows Mathematics and Science marks for ten pupils:

Pupil	1	2	3	4	5	6	7	8	9	10
Maths	20	22	26	27	37	42	43	52	56	60
Science	25	26	22	30	40	45	48	58	52	48

a] Plot a scatter graph of the maths scores against the science scores for each pupil on the grid below:
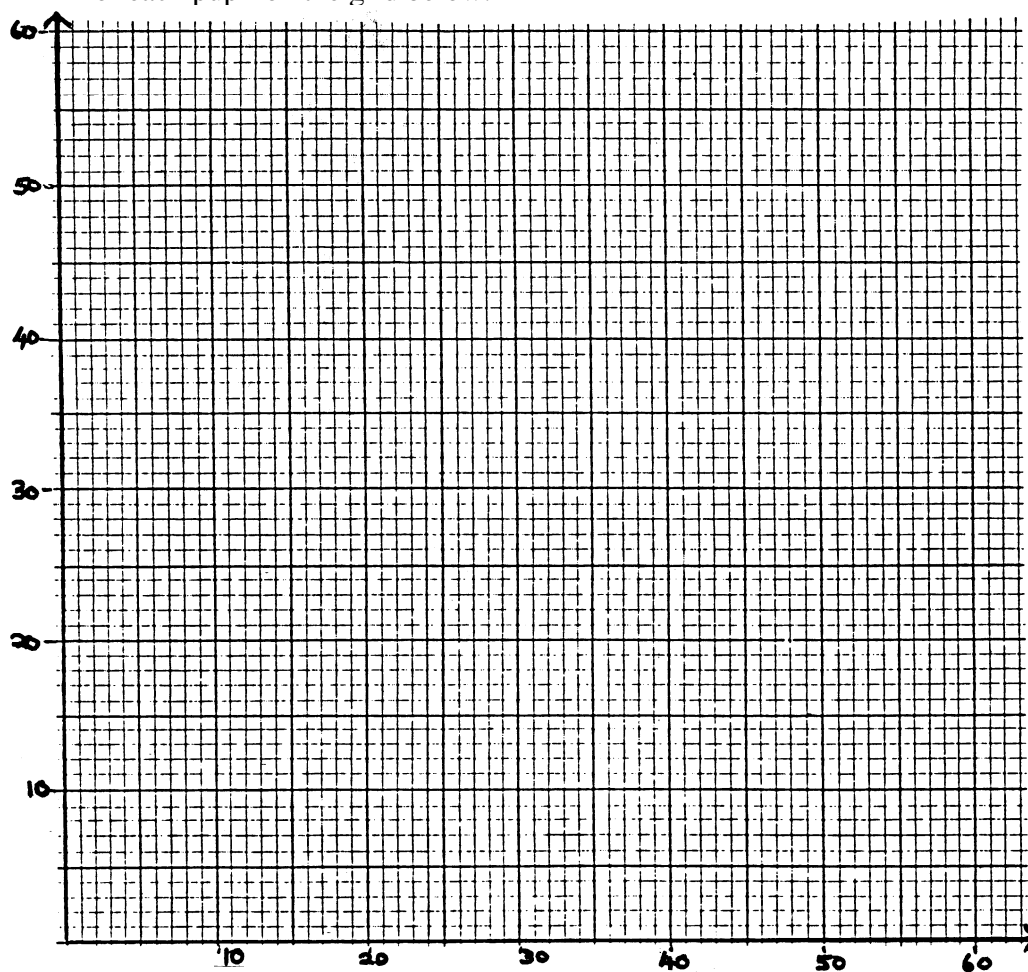
b] Draw the line of best fit on your graph.

c] Use your graph to predict marks for Pupil A and Pupil B if:

Pupil A scores 10 for maths

Answer   Predicted science mark for Pupil A = _____

and Pupil B scores 50 for science

Answer   Predicted maths mark for Pupil B = _____

/Turn over

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20. a]   How many times would you expect to get a six if you rolled
          a fair dice 18 times?

          Answer   _____
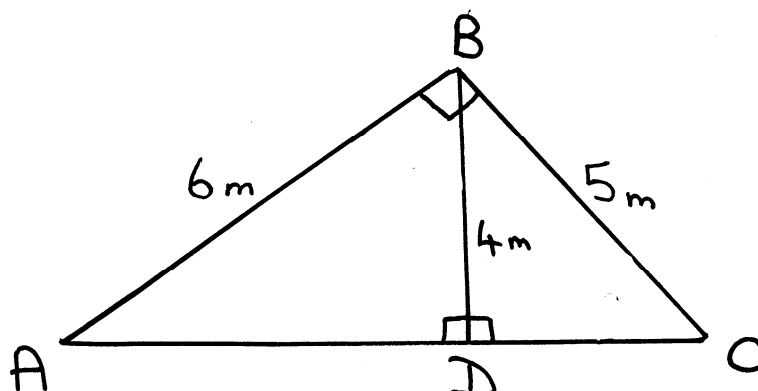
     b]   What is the probability of getting either a 1 or a 2 on one roll
          of a fair die?

          Answer   _____

     c]   If a pair of dice are rolled together, what is the probability
          of a **total** score of 8?

          Answer   _____

21.

     a]   Find the length of AD

          Answer   AD = _____

     b]   Find the length of DC.

          Answer   DC = _____

     c]   Hence find the area of $\triangle$ ABC.

          Area of $\triangle$ ABC = _____

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