

Half-Yearly Examinations for Secondary Schools 2020

YEAR 10

MATHEMATICS

TIME: 1h 40min

Main Paper

Question	1	2	3	4	5	6	7	8	9	10	11	Total Main	Non Calc	Global Mark
Mark														

DO NOT WRITE ABOVE THIS LINE.

Name: _____

Class: _____

**CALCULATORS ARE ALLOWED BUT ALL NECESSARY WORKING MUST BE SHOWN.
ANSWER ALL QUESTIONS.**

1. Expand and simplify:

(a) $7 + 3(x - 2)$

(b) $5(2x - 1) - 2(x + 4)$

(c) $(3a - 1)(3a + 1)$

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

(8 marks)

2. Factorise completely:

(a) $5a^2 + 15ab$

(b) $x^2 - 3x - 10$

(c) $2x^2 - 50$

(d) $3a^2 - 2a - 8$

(8 marks)

3. (a) Express 72, 120 and 192 as a product of their prime factors.

Ans: $72 =$ _____

$120 =$ _____

$192 =$ _____

(b) A company wants to produce identical lighting units that connect to each other to form one lighting system.



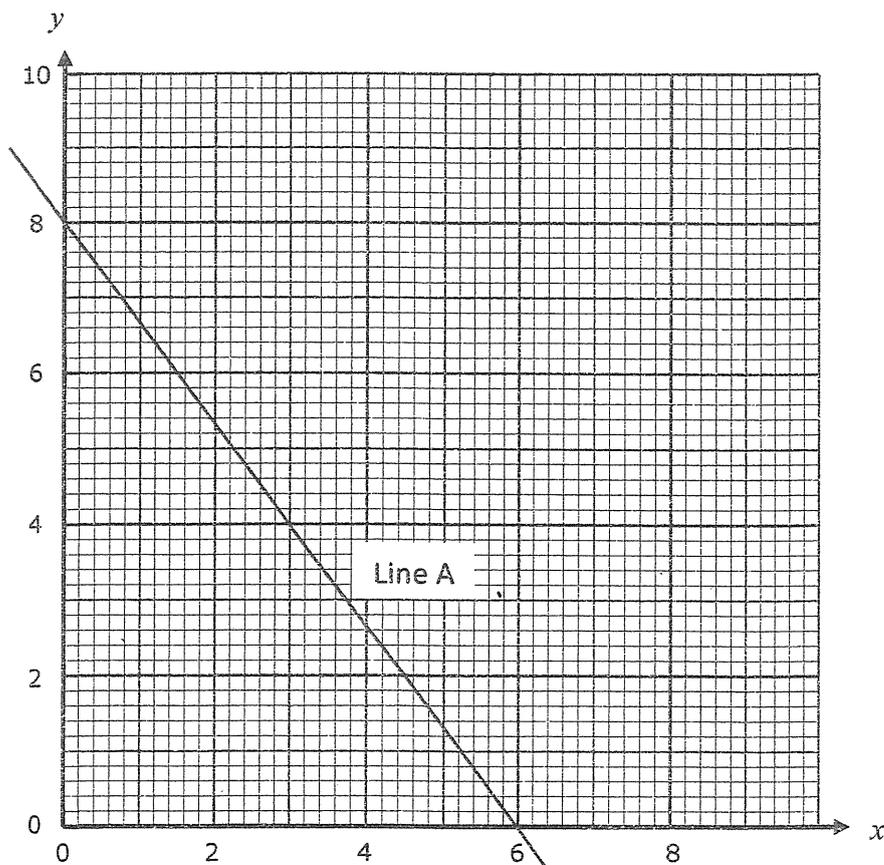
The company needs to be able to make straight sections of the lighting system that are 72 cm, 120 cm and 192 cm long.

What is the longest possible length of one lighting unit?

Ans: _____

(6 marks)

4.



(a) Use the graph above to answer the following:

(i) Work out the gradient of line A.

Ans: _____

(ii) Write the equation of line A.

Ans: _____

(b) What is the exact value of x when $y = 4.7$?

Ans: $x =$ _____

(c) Line B is parallel to Line A and passes through the point $(0, -3)$.
Write the equation of Line B.

Ans: _____

(7 marks)

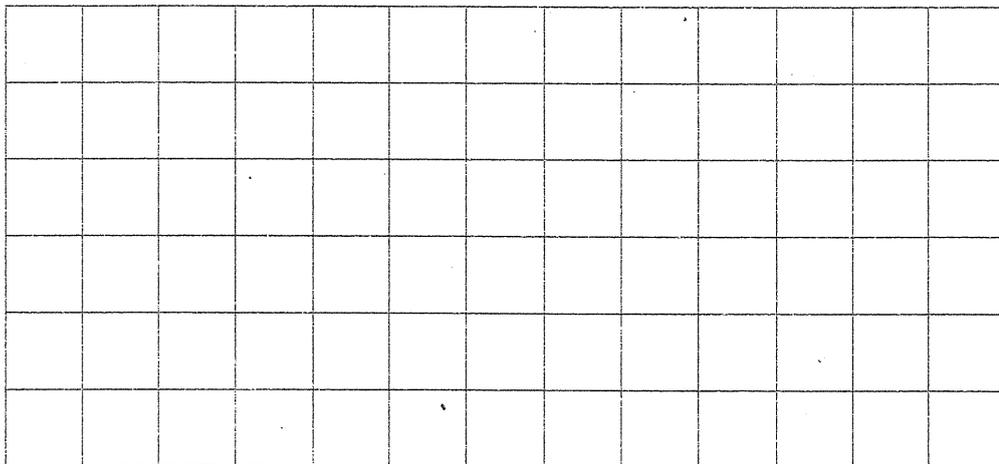
5. The times (in minutes) taken by 25 students to complete a mathematical puzzle are shown below:

5	7	7	8	10
11	12	12	14	15
15	16	18	18	19
20	22	23	24	25
25	26	31	33	54

- (a) Use this information to fill in the table below:

Time t in minutes	Frequency
$0 \leq t < 10$	
$10 \leq t < 20$	
$20 \leq t < 30$	
$30 \leq t < 40$	
$40 \leq t < 50$	
$50 \leq t < 60$	

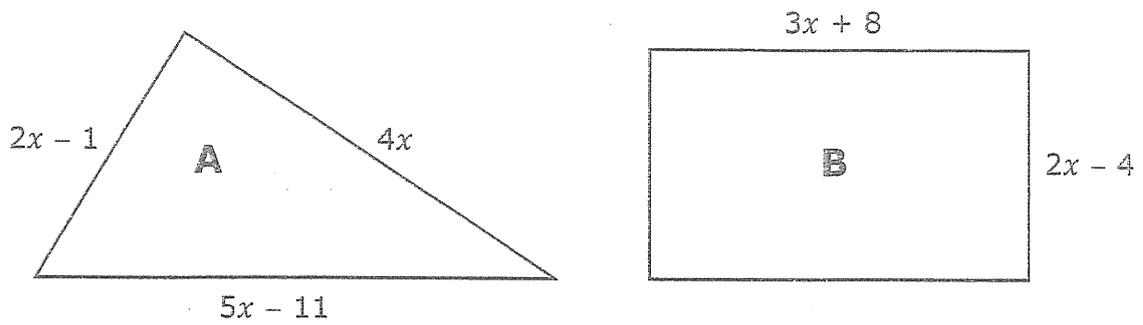
- (b) Draw a histogram to illustrate the frequency table on the grid below.



- (c) From the information given above, suggest an appropriate time limit for the students to complete the puzzle. Explain your reasoning.

(8 marks)

6. The diagrams below show the dimensions in terms of x , of the sides of a triangle A and a rectangle B. The lengths of the sides of these shapes are in centimetres.



Diagrams not drawn to scale

- (a) Write and simplify an expression for the perimeter of:
- (i) triangle A

Ans: _____

- (ii) rectangle B

Ans: _____

- (b) The perimeter of triangle A is equal to the perimeter of rectangle B.
Write an equation in terms of x and solve it.

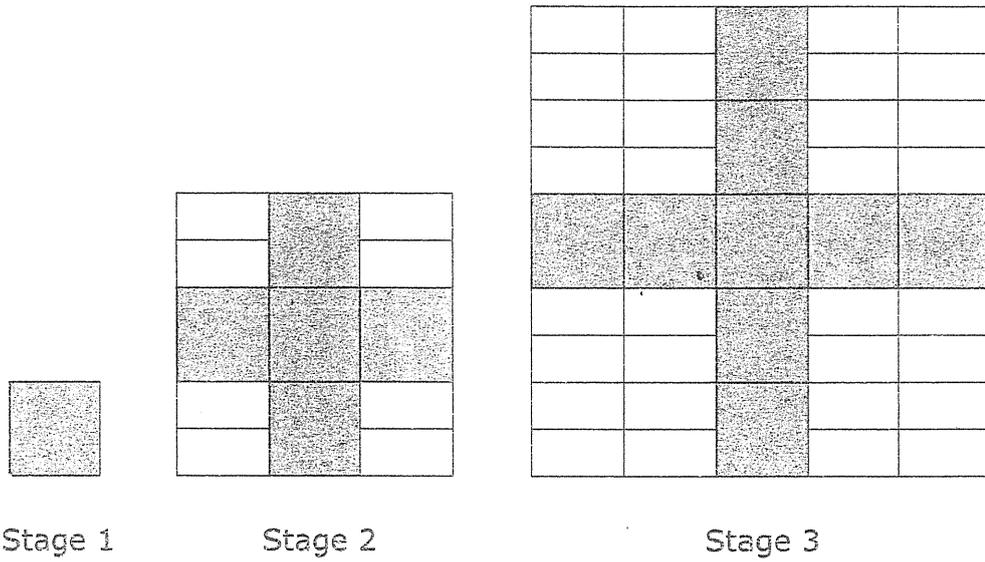
Ans: $x =$ _____

- (c) What are the dimensions of rectangle B?

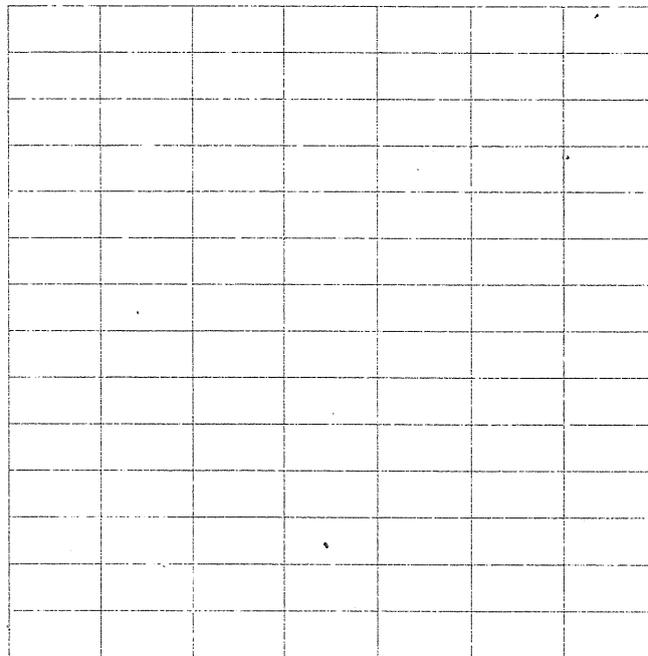
Ans: _____ and _____

(7 marks)

7. Mark is tiling a space in stages. He uses grey square tiles to cover a cross in the middle of the space and fills the corners with white rectangular tiles as shown below.



- (a) Use the grid below to draw Stage 4.



- (b) Fill in the table below:

Stage Number	1	2	3	4	5
Number of grey tiles	1	5	9		
Number of white tiles	0				

- (c) Work out the n^{th} term for the number of **grey** tiles.

Ans: _____

- (d) Can there be a stage with 200 **white** tiles?
Show working to explain your reasoning.

(8 marks)

8. Karen and Martin organised a closing-down sale in their clothes shop.
They reduced the prices of all items in the shop by 30%.
During the last week of sale, Martin reduced the prices by a further 20%.

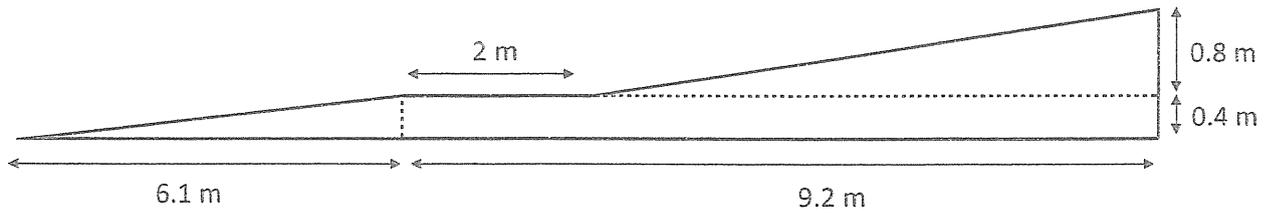
- (a) Karen says that during the last week the clothes cost 50% of the original price. Martin says that the reduction in price is less than 50%.
Who is correct? Explain your reasoning.

- (b) The original price of a jacket is €88.40.
Calculate the price of the jacket during the last week of the sale.

Ans: _____

(5 marks)

9. The diagram below shows the cross-section of a concrete ramp.



- (a) Work out the area of cross-section of the concrete ramp in square metres.

Ans: _____

- (b) The ramp, which is a prism, is 1.5 m wide.

- (i) Calculate the volume of concrete used to construct the ramp.
Give your answer in cubic metres.

Ans: _____

- (ii) Give your answer to part (i) in litres.

Ans: _____

(8 marks)

10. Angela is standing at the top of a vertical cliff looking at a boat P out at sea. The angle of depression of the boat from her line of sight is 18° . The top of the cliff is 50 m above sea level and Angela's eye height is 1.5 m.

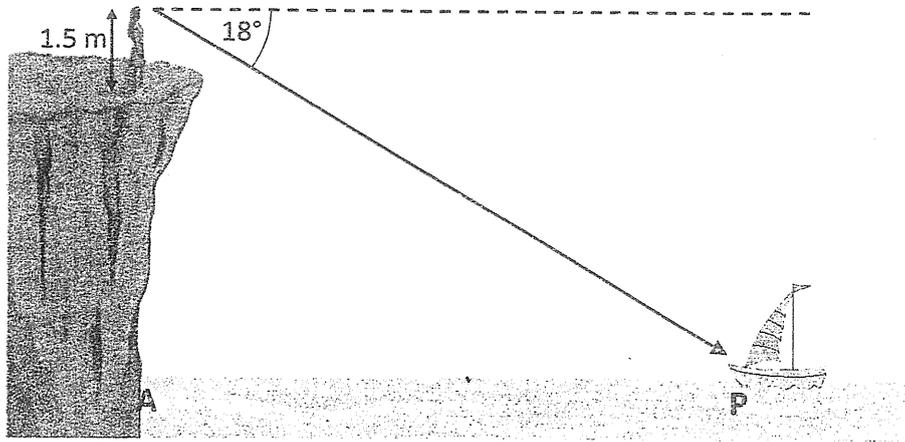


Diagram not drawn to scale

- (a) How far is the boat from the base of the cliff?

Ans: _____

The boat sails further away from the cliff to another point Q, such that APQ is a straight line. Angela sees the boat at Q at an angle of depression of 10° .

- (b) How far did the boat sail from P to Q?

Ans: _____

(6 marks)

11. ABCDE is a pentagon and M is the mid-point of AE. CM is perpendicular to AE. Lines AB, MC and ED are parallel to each other.

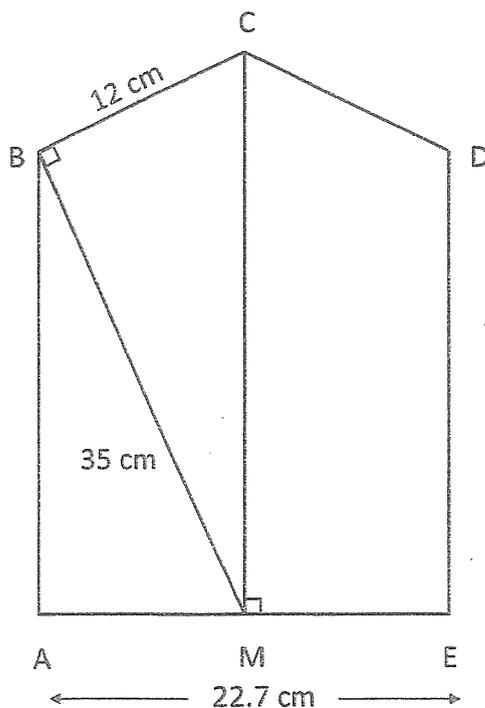


Diagram not drawn to scale

- (a) Work out the size of angle \widehat{BMC} .

Ans: _____

- (b) Calculate the length of side AB.

Ans: _____

- (c) Work out the area of pentagon ABCDE.

Ans: _____

(9 marks)

End of Paper

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