DEPARTMENT FOR CURRICULUM,
RESEARCH, INNOVATION AND LIFELONG LEARNING
Directorate for Learning and Assessment Programmes

Track 2

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	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.

a) Expand and simplify:

i) $4(3x-5)$

Ans: _____

ii) $2y(7y+1)$

Ans: _____

b) $18\,mn^2 = A \times 6\,m^2n$
Write A in terms of m and n in its simplest form.

Ans: $A =$ _____

c) Factorise completely: $12x^2y - 4xy^3$

Ans: _____

(8 marks)

2. Find the value of each letter:

a) $4^x = 16$

Ans: $x =$ _____

b) $y^3 = 27$

Ans: $y =$ _____

c) $5^a = \frac{1}{5}$

Ans: $a =$ _____

d) $19^z = 1$

Ans: $z =$ _____

(6 marks)

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3. A Triathlon is a three-stage race: 1.5 km swimming, 40 km cycling and 10 km running. An athlete swam for 40 minutes, cycled for 1 hour 20 minutes and ran for 1 hour.

a) Calculate the speed for each stage of the race in km/h.

Ans: Swimming _____ ; Cycling _____ ; Running _____

b) Calculate the average speed of the Triathlon, in km/h correct to 2 decimal places.

Ans: _____

(9 marks)

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4. The circular frame of a painting is made up of **six** sections, 3 cm wide. One of these sections is shown in the diagram:

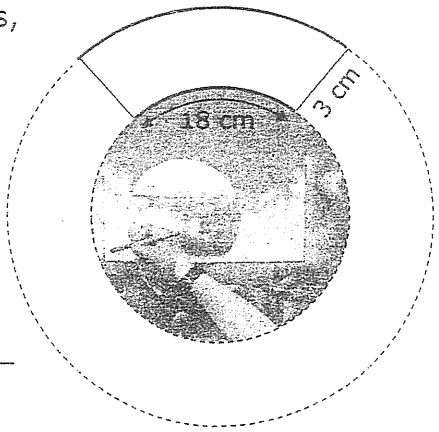


Diagram not drawn to scale

a) Calculate the circumference of the **painting**.

Ans: _____

b) Given that $C = 2\pi r$, make r the subject of the formula.

Ans: _____

c) Calculate the radius of the **painting**.

Ans: _____

d) Calculate the area of the **painting**.

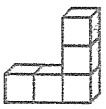
Ans: _____

e) Calculate the area of the **frame**.

Ans: _____

(10 marks)

5. The pattern below is made of unit cubes of length 1 cm.

					
Pattern	1	2	3	4	5
Surface area (cm^2)	6	14			

a) Complete the table above.

b) What is the surface area of pattern n.

Ans: _____

c) Use your answer in question b) to find the surface area of pattern 100.

Ans: _____

d) Which pattern has an area of 254 cm^2?

Ans: _____

(9 marks)

6. ABC is a straight line. ABE and BCD are two triangles such that EA is parallel to DB and EB is parallel to DC. AB = EB and $B\hat{C}D = 58°$

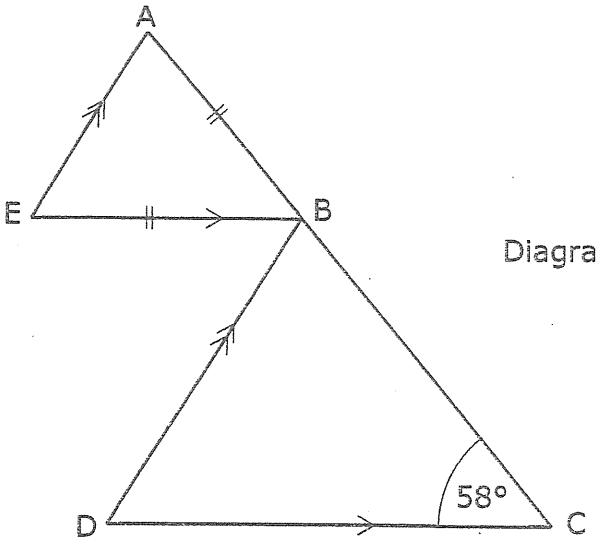


Diagram not drawn to scale

a) Calculate the size of the following angles.
Give a reason for your answer where it is indicated.

i) $A\hat{B}E$

Ans: _____ Reason _____

ii) $A\hat{E}B$

Ans: _____

iii) $B\hat{D}C$

Ans: _____

iv) $D\hat{B}C$

Ans: _____ Reason _____

b) What type of triangle is BDC? Give a reason for your answer.

Ans: _____ Reason _____

(10 marks)

7. A, B and C are squares drawn on the sides of a right-angled triangle.

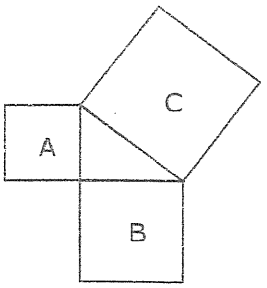


Diagram not drawn to scale

a) What can you say about the areas of these three squares?

_____

_____

b) The area of triangle A is 3.9 cm^2 and the area of triangle B is 5.2 cm^2. Calculate the length of the hypothenuse of the triangle.

Ans: _____

(4 marks)

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8. Ash and Smoke are two different types of grey paint. These are mixed from black and white paint in the ratios shown:

	black paint : white paint
Ash	3 : 5
Smoke	2 : 3

a) Which is the darker paint, Ash or Smoke? Show your reasoning.

b) 5 litres of black paint are used to make Smoke paint. How much white paint is needed?

Ans: _____

c) How much black paint is needed to make 2 litres of Ash paint? Give your answer in ml.

Ans: _____

(7 marks)

9. Two trees are standing on horizontal ground. The horizontal distance between the small tree and point G on the ground is 8 m. The distance between the tops of the trees is 21 m. The angle of elevation of the tops of the trees from point G is 38°.

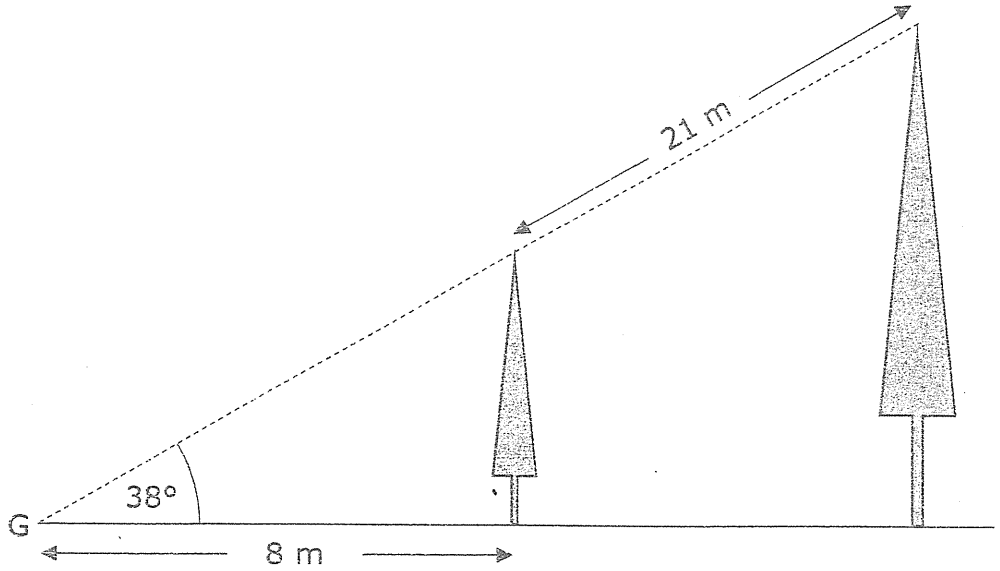


Diagram not drawn to scale

Calculate:

a) The height of the small tree;

Ans: _____

b) the distance between G and the top of the small tree;

Ans: _____

c) the horizontal distance between the trees;

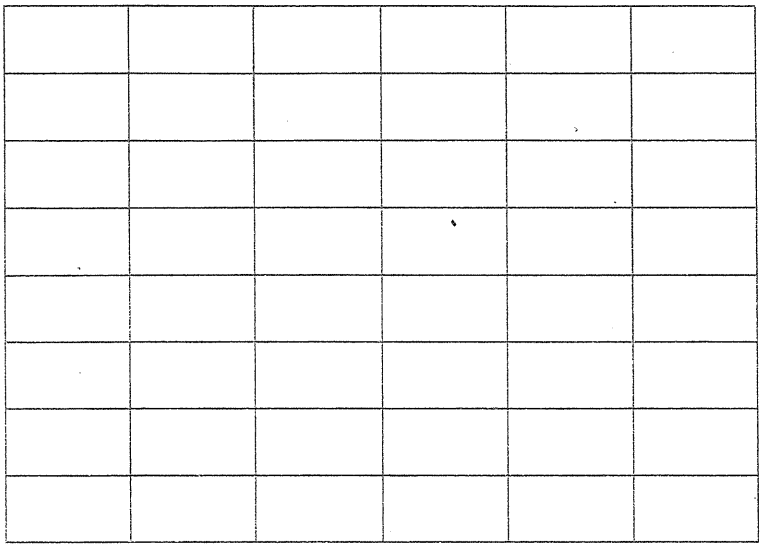
Ans: _____

(9 marks)

10. A traffic policeman measured the speeds of vehicles that passed on a main road. The frequency table shows all the speeds measured.

Speed (s) in km/h	$20< s \leq 30$	$30< s \leq 40$	$40< s \leq 50$	$50< s \leq 60$	$60< s \leq 70$	$70< s \leq 80$
Frequency	4	12	18	32	8	2

a) Draw a histogram to illustrate the data in the frequency table.



b) How many vehicles were moving at 40 km/h or less?

Ans: _____

c) The speed limit for this road is 60 km/h.
How many vehicles were caught over-speeding?

Ans: _____

d) The fines for over-speeding are:
€32 for speeds above 60 km/h up to 70 km/h;
€68 for speeds above 70 km/h up to 80 km/h;
€100 for speed above 80 km/h.

Calculate the total amount of fines in euro.

Ans: _____

(8 marks)

End of examination