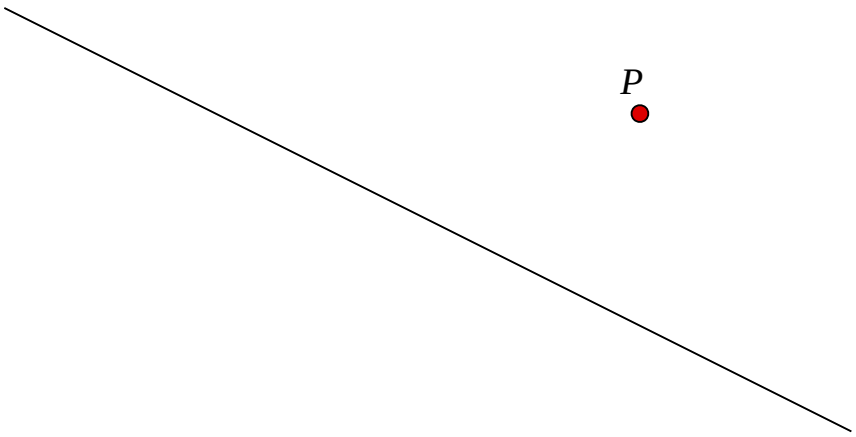
“Mind Your Maths” Number 4
Year 10 Exam Revision

You may use a calculator
Marks Available : 60

Question 1

Using a ruler and pair of compasses construct a perpendicular to the line below which passes through` point *P*. You must show all your construction lines.



[3 marks]

Question 2

$$f(x) = x^2 + 1, \qquad x \in \mathbb{R}$$

$$g(x) = \frac{1}{x - 3}, \qquad x \in \mathbb{R},\ x \neq 3$$

(i) Explain why function g has the number 3 excluded from its domain.

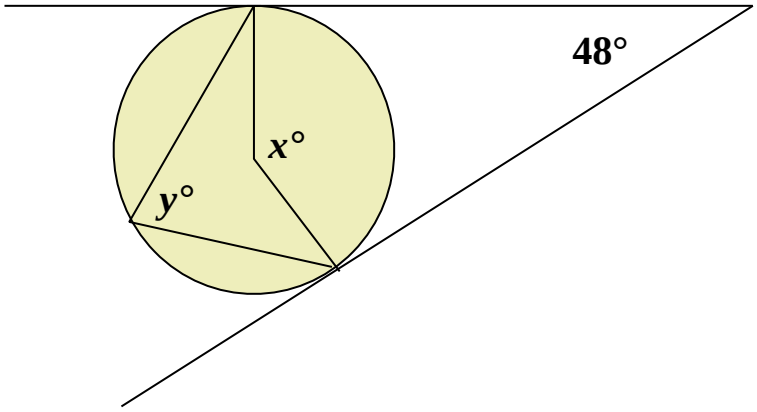
[1 mark]

(ii) Find the value of $fg(5)$

[3 marks]

Question 3

Two lines, tangential to a circle, meet in an angle of 48°.



(i) State the size of angle *x*.

[2 marks]

(ii) State the size of angle *y*.

[2 marks]

Question 4

(i) A remote controlled kettle normally costs £640.
In a sale, the price is reduced by 30%.
What is the sale price of the kettle ?

[2 marks]

(ii) A wind up radio is on sale for £28.70, having already been reduced by 30%.
What is the normal cost of the radio ?

[2 marks]

Question 5

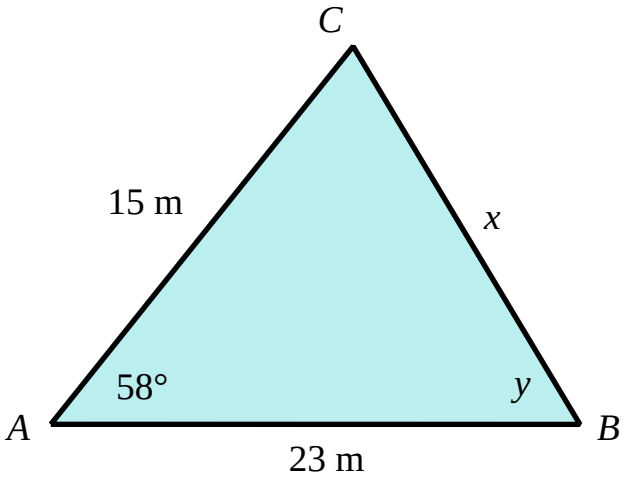
For your information in ΔABC with sides of length a, b and c.

The cosine rule : $c^2 = a^2 + b^2 - 2ab\cos C$

The sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Area of a triangle : $Area = \frac{1}{2}ab\sin C$

The diagram shows a triangle ABC.



(i) Calculate, correct to one decimal place, the distance x.

[3 marks]

(ii) Calculate, correct to one decimal place, the angle y.

[3 marks]

(iii) Calculate, to the nearest integer, the area of the triangle.

[2 marks]

Question 6

A fair die with the numbers 1 to 6 is rolled once.
A fair spinner with the numbers 2, 3 and 5 is also spun once.
The **positive** difference between the numbers is recorded.

(i) Complete this table of possible outcomes.

		Die					
		1	**2**	**3**	**4**	**5**	**6**
Spinner	**2**			**1**			
	3						
	5	**4**					

[2 marks]

(ii) What is the probability of obtaining a difference of 1?

[2 marks]

(iii) What is the probability of obtaining a “5” on the die or spinner (or both)?

[2 marks]

Question 7

Two similar solids have heights of 24 cm and 36 cm.

(i) The smaller solid has a width of 9 cm.
Calculate the width of the larger solid.

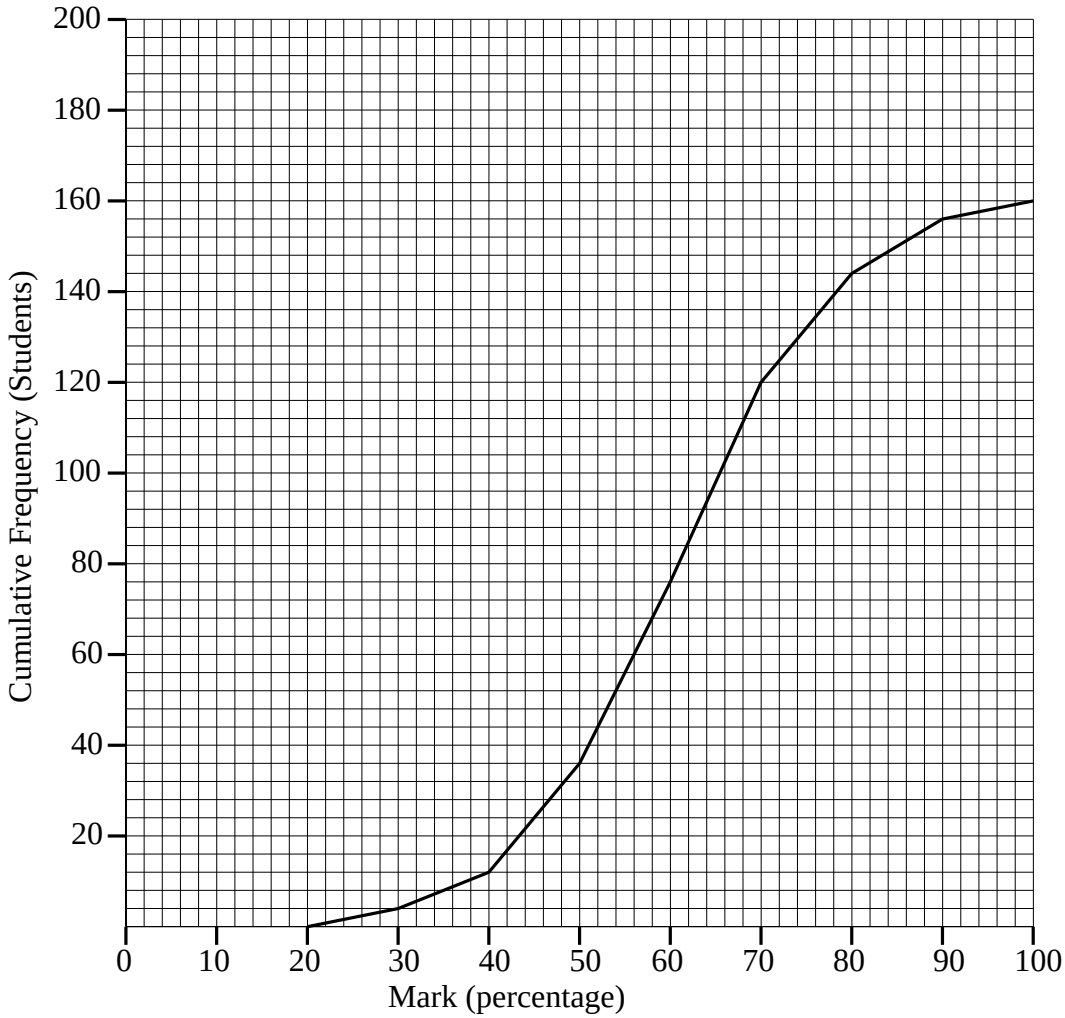
[2 marks]

(ii) The volume of the larger solid is 9477 cm^3.
Calculate the volume of the smaller solid.

[3 marks]

Question 8

A cumulative frequency diagram is presented below.
It concerns the scores in an Archery Competition by a group of 160 students.



(i) Roughly how many students scored over 80% in the competition ?

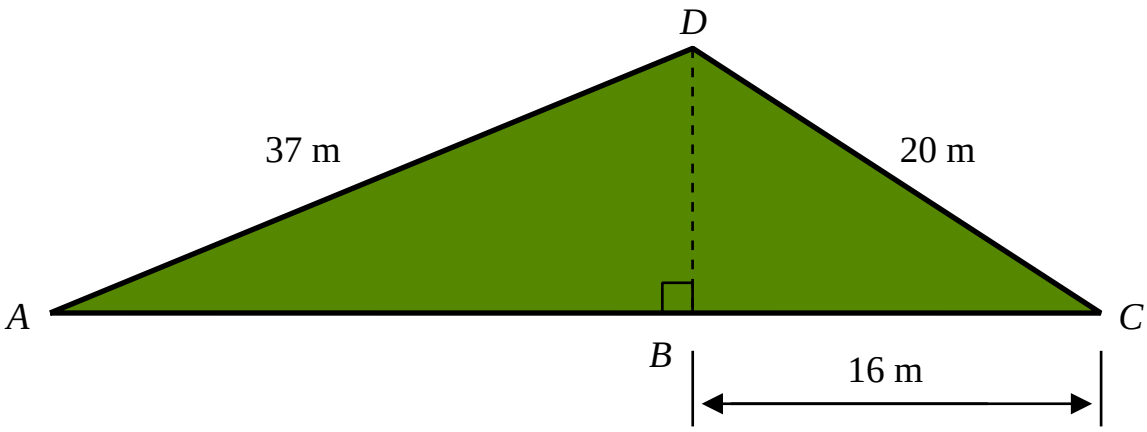
[2 marks]

(ii) *Use the graph* to estimate the interquartile range of the marks.
Leave evidence on the graph that demonstrates you did indeed *use the graph*.

[3 marks]

Question 9

The diagram below shows a triangular lawn *ADC*.
A fence *DB* runs across the lawn, meeting the edge *AC* at right angles.



(i) Calculate the length *AC*.

[5 marks]

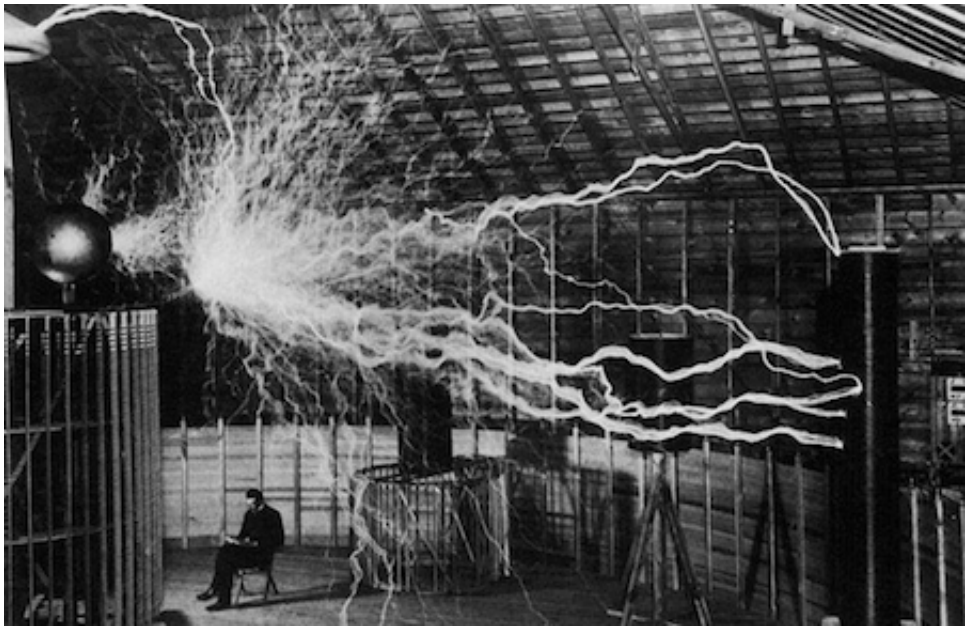
(ii) Find the area of the lawn, giving the correct units in your answer.

[2 marks]

(iii) Calculate the angle *BCD*, correct to 1 decimal place.

[2 marks]

Question 10



The Physicist, Nikola Tesla, conducting his famous high voltage experiments in his laboratory in Colorado Springs, USA, 1899.

In the physics of electrostatics, the electric field strength E is inversely proportional to the cube of the distance, d, from a highly charged electric dipole.
It is known that $E = 75$ volt per metre when $d = 2$ metres.

(i) Find a formula for E in terms of d for this dipole.

[3 marks]

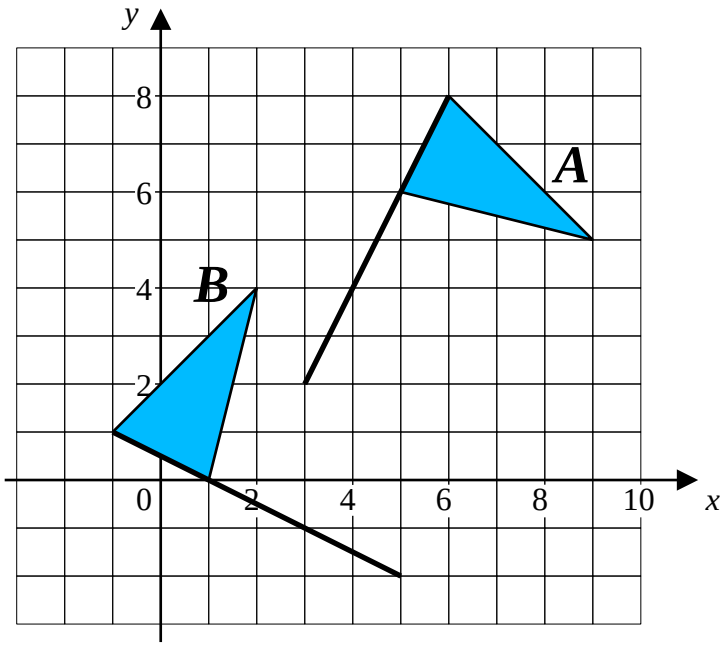
(ii) Find the exact value of E when $d = 4$.

[2 marks]

(iii) Find the value of d when $E = 0.4$
Give your answer to 3 significant figures.

[2 marks]

Question 11



(i) Translate flag *B* by the vector $\begin{pmatrix} -2 \\ 4 \end{pmatrix}$

Label your translated flag, *X*.

[2 marks]

(ii) Find a single transformation that will move flag *A* on top of flag *B*.

[3 marks]