

SAMPLE PAPER 7

Leaving Certificate

Mathematics

Paper 2

Ordinary Level

Time: 2 hours, 30 minutes

300 marks

Examination number

Centre stamp

Running total	
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For examiner	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
Total	

Grade

Instructions

There are **two** sections in this examination paper.

Section A	Concepts and Skills	150 marks	6 questions
Section B	Contexts and Applications	150 marks	2 questions

Answer all eight questions.

Write your answers in the spaces provided in this booklet. You will lose marks if you do not do so. There is space for extra work at the back of the booklet. You may also ask the superintendent for more paper. Label any extra work clearly with the question number and part.

The superintendent will give you a copy of the *Formulae and Tables* booklet. You must return it at the end of the examination. You are not allowed to bring your own copy into the examination.

Marks will be lost if all necessary work is not clearly shown.

Answers should include the appropriate units of measurement, where relevant.

Answers should be given in simplest form, where relevant.

Write the make and model of your calculator(s) here:

Answer **all six** questions from this section.

Question 1

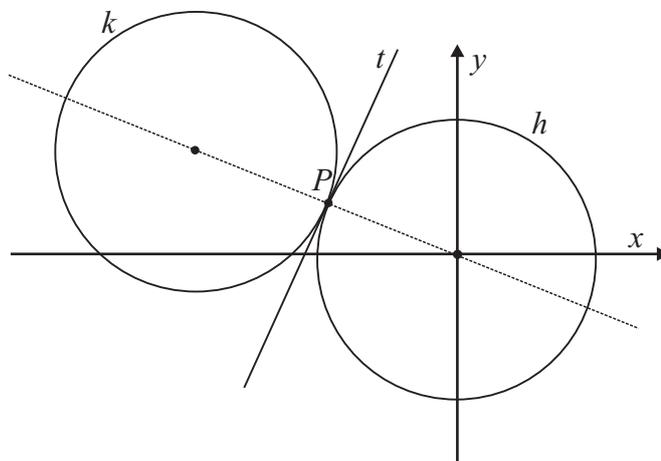
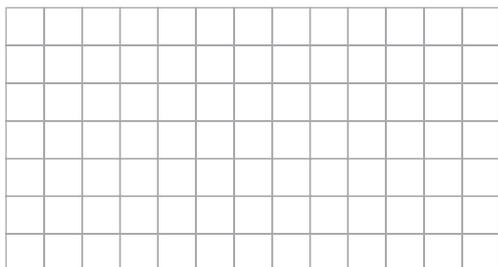
(25 marks)

The diagram shows two circles h and k , of equal radius.

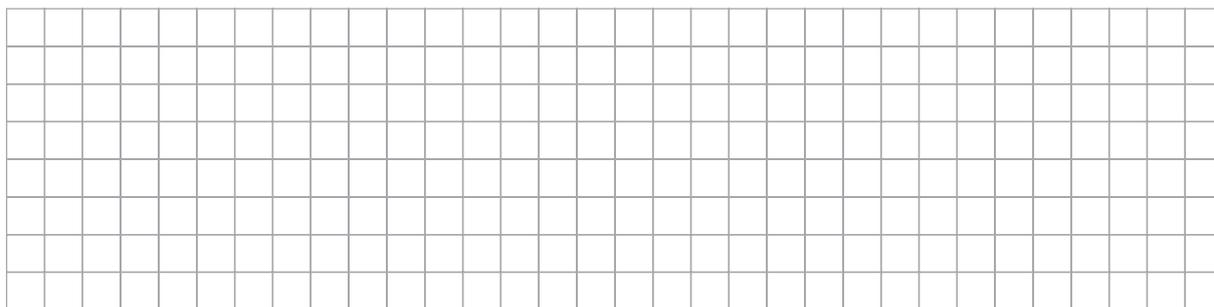
The circles touch at the point $P(-2, 1)$.

The circle h has centre $(0, 0)$.

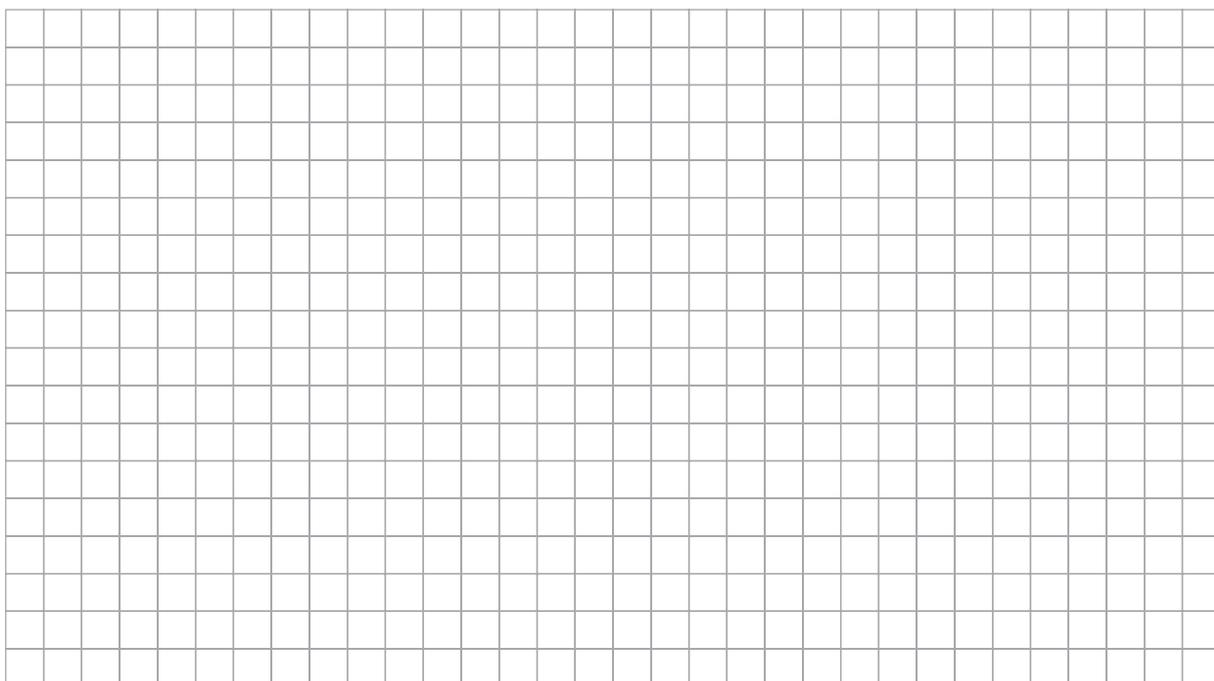
- (a) Find the equation of h .



- (b) Find the equation of k .



- (c) t is a tangent to the circles at P . Find the equation of t .

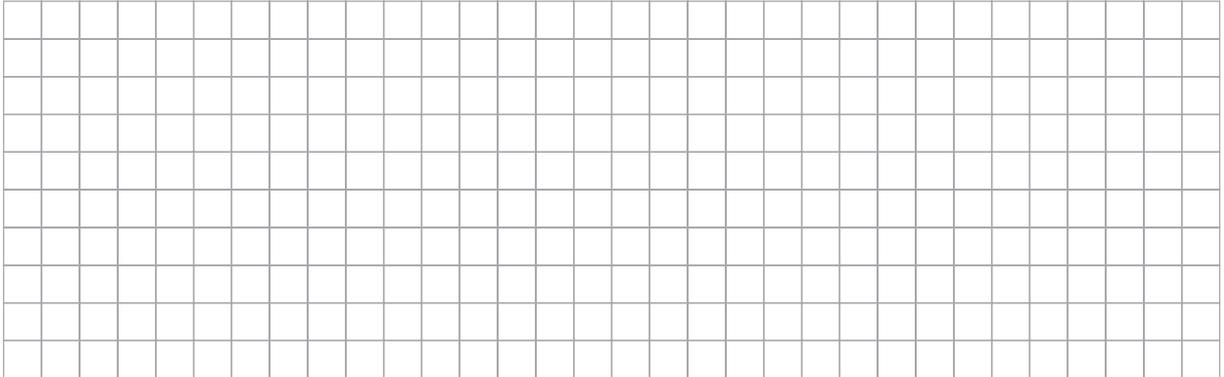


Question 2

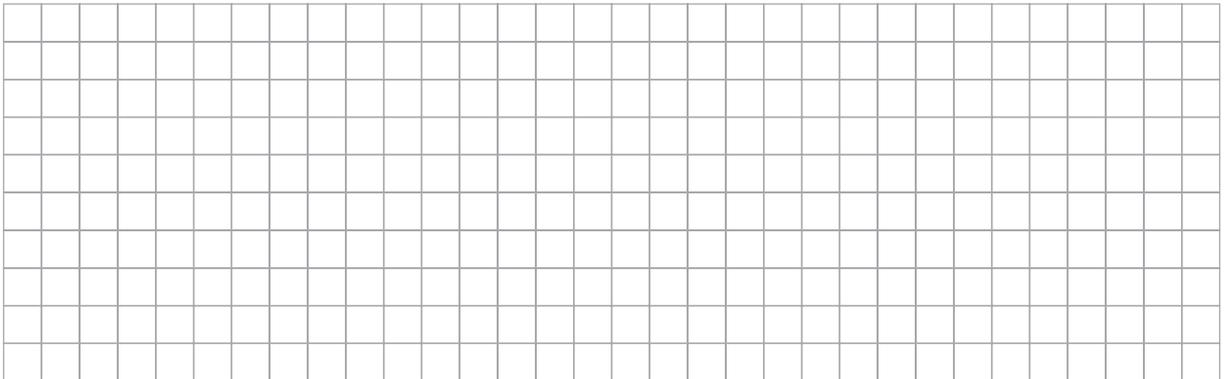
(25 marks)

$A(3, 3)$, $B(-3, 1)$ and $C(-1, 5)$ are three points.

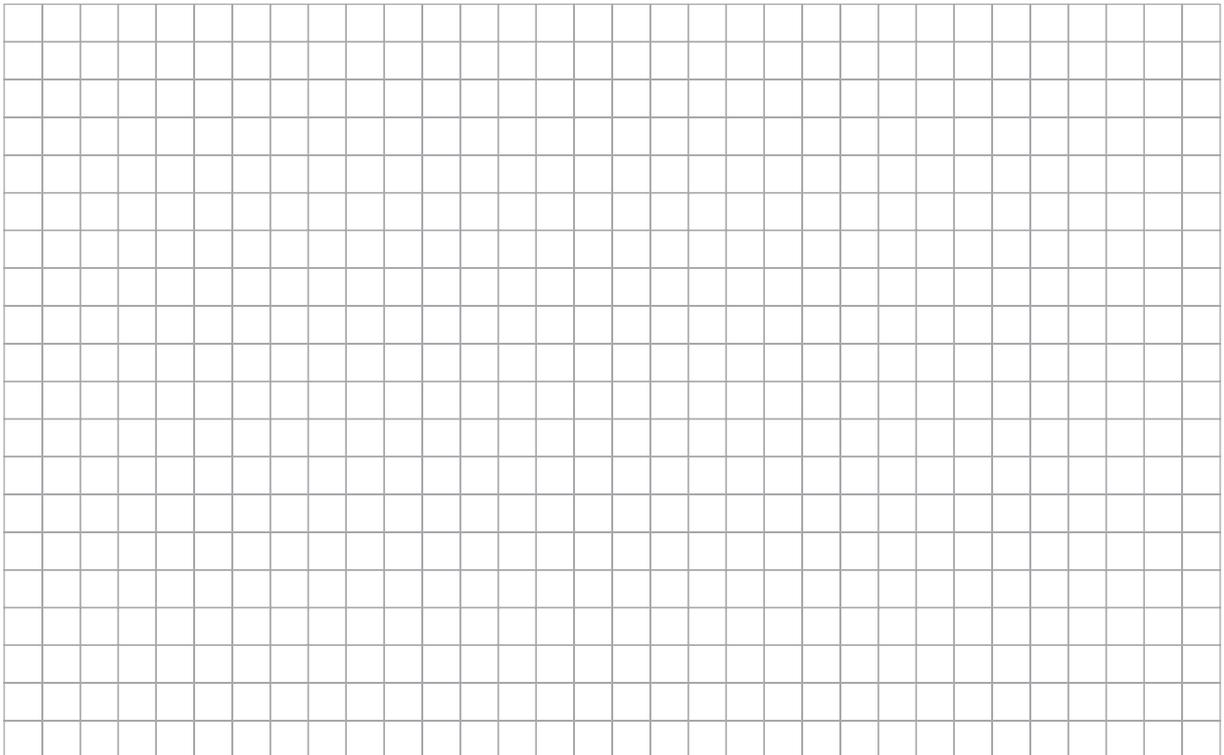
- (a) (i)** Prove that line AC is perpendicular to line BC .



- (ii)** Prove that $|AC| = |BC|$.



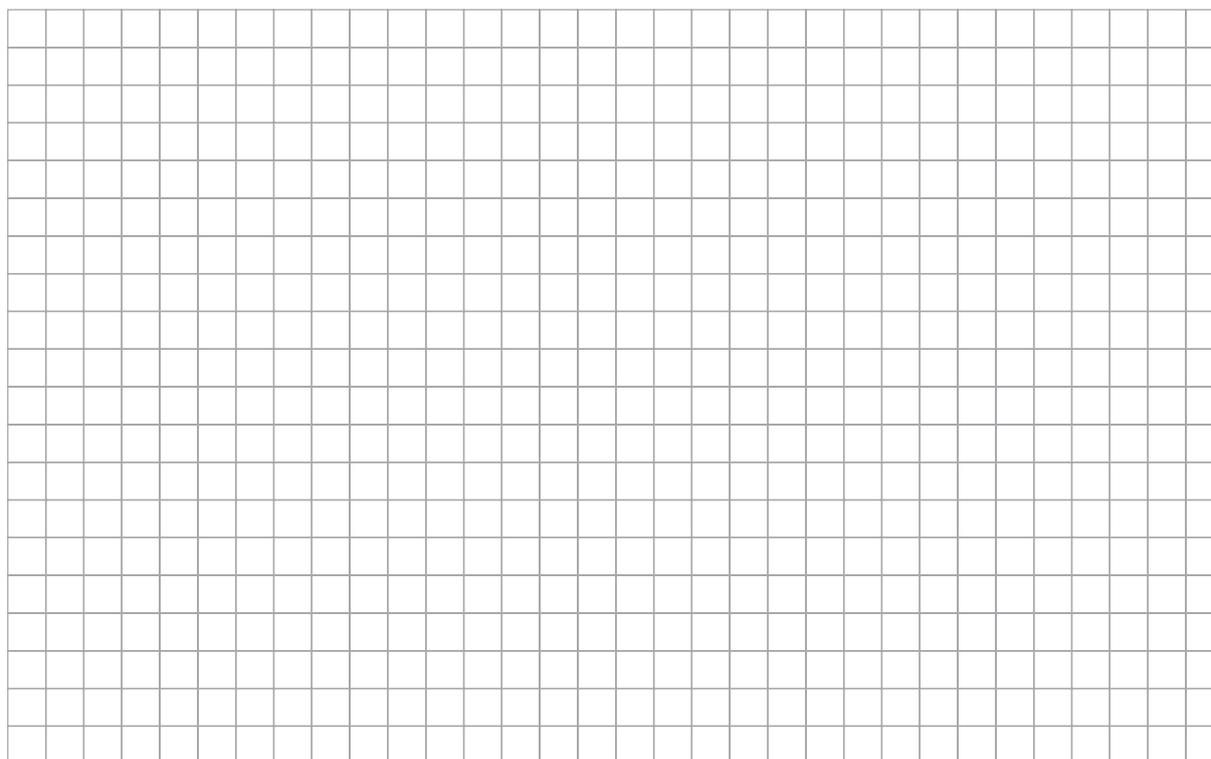
- (b)** Calculate the area of triangle BAC .



- (c) (i) The diagonals of the square $BAHG$ intersect at C . Find the coordinates of H and the coordinates of G .



- (ii) Find the equation of line BC and show H lies on this line.

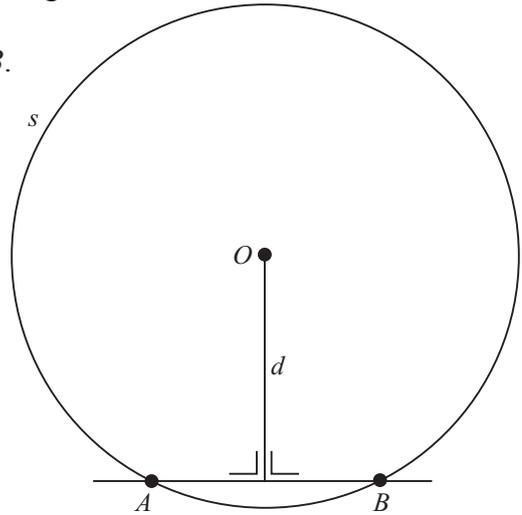
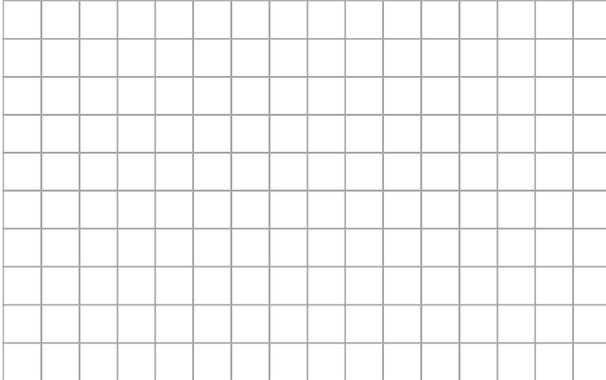


Question 3

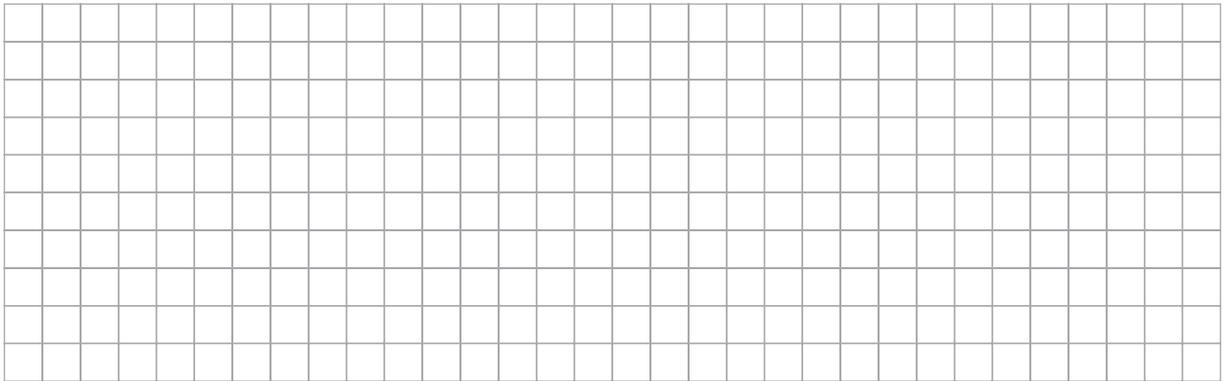
(25 marks)

s is a circle with centre O and radius 5. $[AB]$ is a chord of length 6 units.

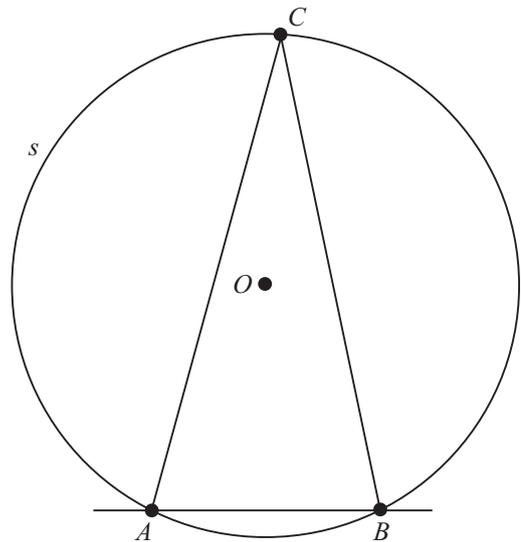
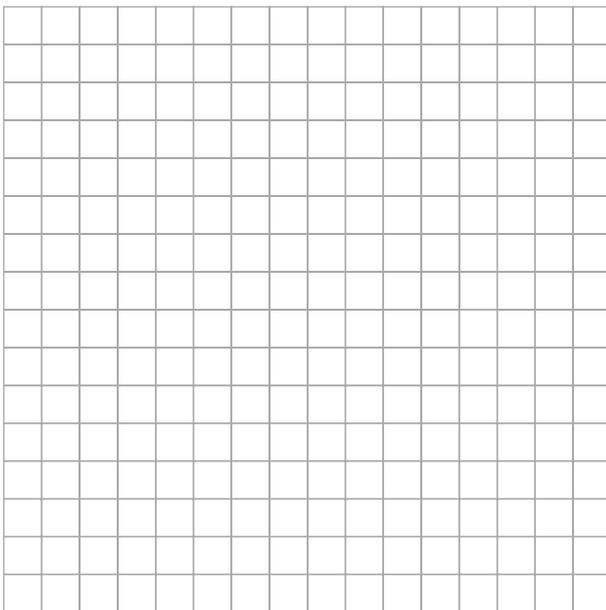
- (a) (i) Find the perpendicular distance d from O to AB .



- (ii) Find $|\angle AOB|$, to two decimal places.



- (b) C is any point on the circle s . Find $|\angle ACB|$, to two decimal places.



Question 4

(25 marks)

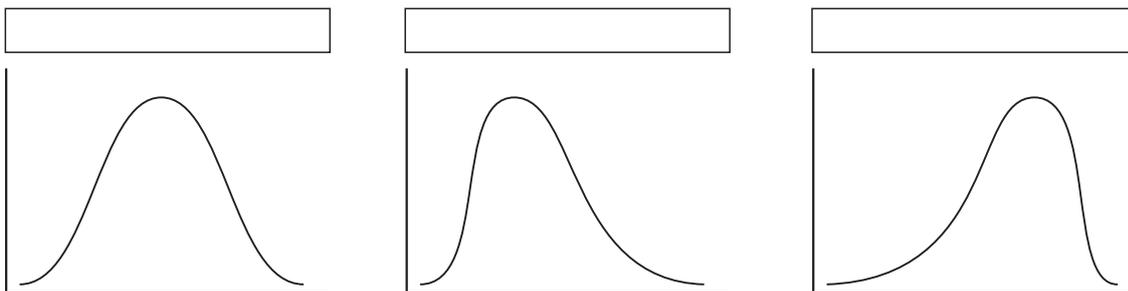
(a) Complete Table A by matching the items on the right to the items on the left.

1. Frequency	A. Type of numerical data that could take on any real number in an interval, including decimals.
2. Pie Chart	B. The number of occurrences of an item or an event.
3. Line Plot	C. Shows data on a number line with x, or other marks, to show frequency.
4. Scatter Diagram	D. It is the range of the middle 50% of the data values.
5. Continuous Data	E. A chart that uses sectors of a disk to represent what fraction of the data falls into different categories.
6. Interquartile Range	F. 25 th . percentile
7. Univariate Data Set	G. A chart that displays whether there is a relationship between two random variables.
8. First Quartile	H. A data set in which one measurement has been made on each item.

Table A

1.	2.	3.	4.	5.	6.	7.	8.

(b) For each of the graphs below, state if they are skewed left (negatively), symmetric, or skewed right (positively). Draw in the positions of the mode, mean and median on each diagram.



(c) State which type of graph describes the following distributions:

(i) Heights of males aged between 18 and 30.
DISTRIBUTION: _____

(ii) Salaries of 20–65-year-olds working in a company.
DISTRIBUTION: _____

(iii) The life expectancy of people in a number of countries.
DISTRIBUTION: _____

- (e) An Olympic archery target has 10 circles, each separated by 6.1 cm. The radius of the innermost circle is 6.1 cm.

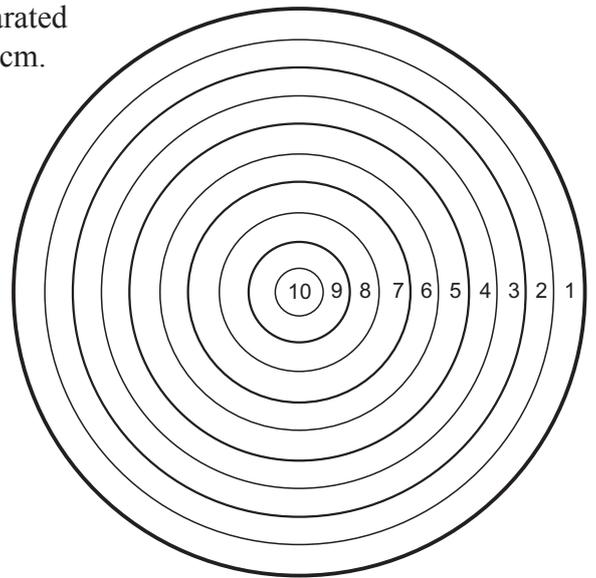
The two innermost circles are coloured gold and score 10 and 9.

The next two circles are coloured red and score 8 and 7.

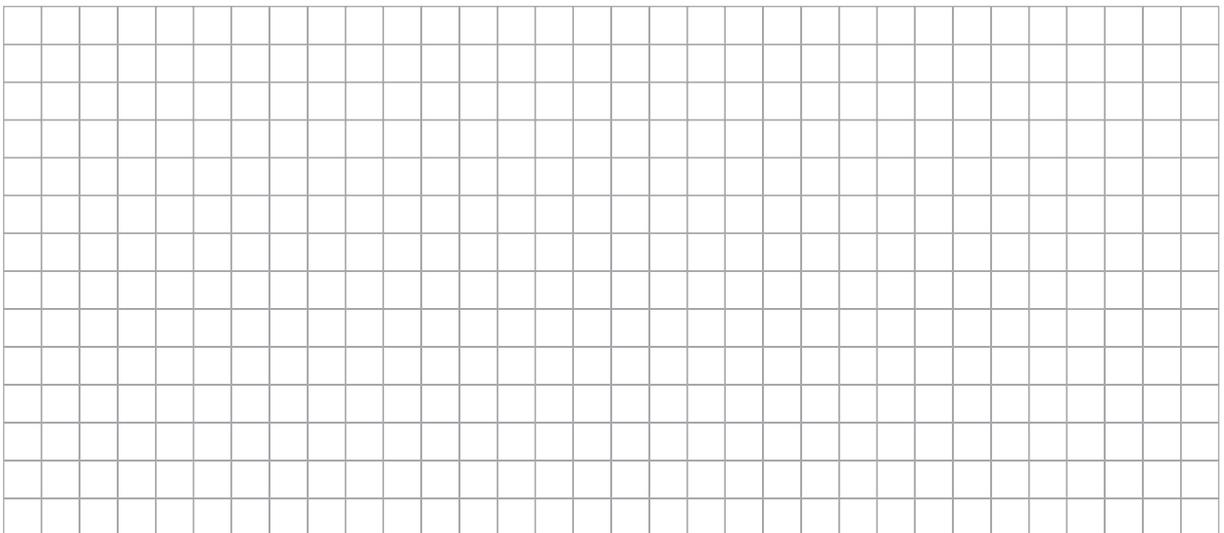
The next two circles are coloured blue and score 6 and 5.

The next two circles are coloured black and score 4 and 3.

The next two circles are coloured white and score 2 and 1.



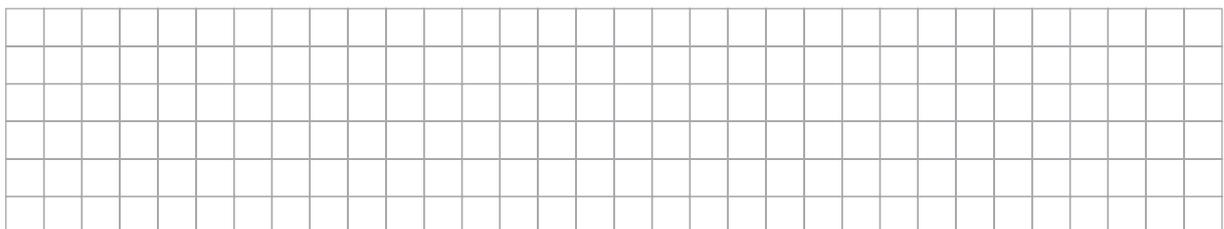
- (i) Find the area of the gold region and the black region. If arrows are fired randomly at the target, how much more likely is it that they will hit the black rather than the gold area?



An Olympic archer has the following scoring profile:

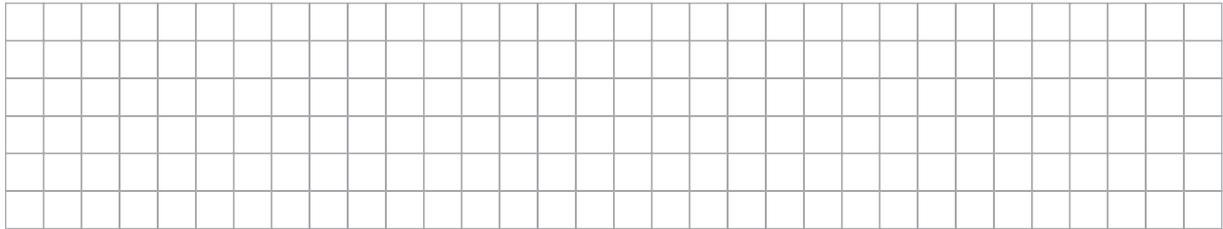
Score x	10	9	8	7	6	5	4	3	2	1
Probability $P(x)$	0.38	0.4	0.12	0.08	y	0.004	0.003	0.002	.0006	.0004
$xP(x)$										

- (ii) Assuming the archer never misses the target, find y .

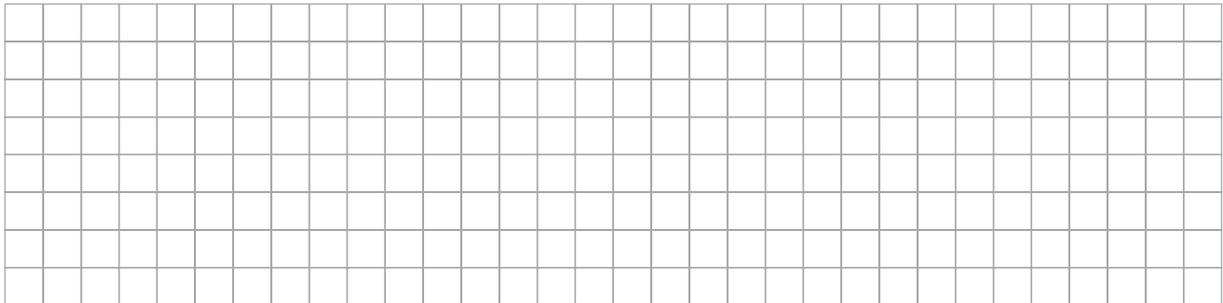


- (iii) Complete the third row of the table above.

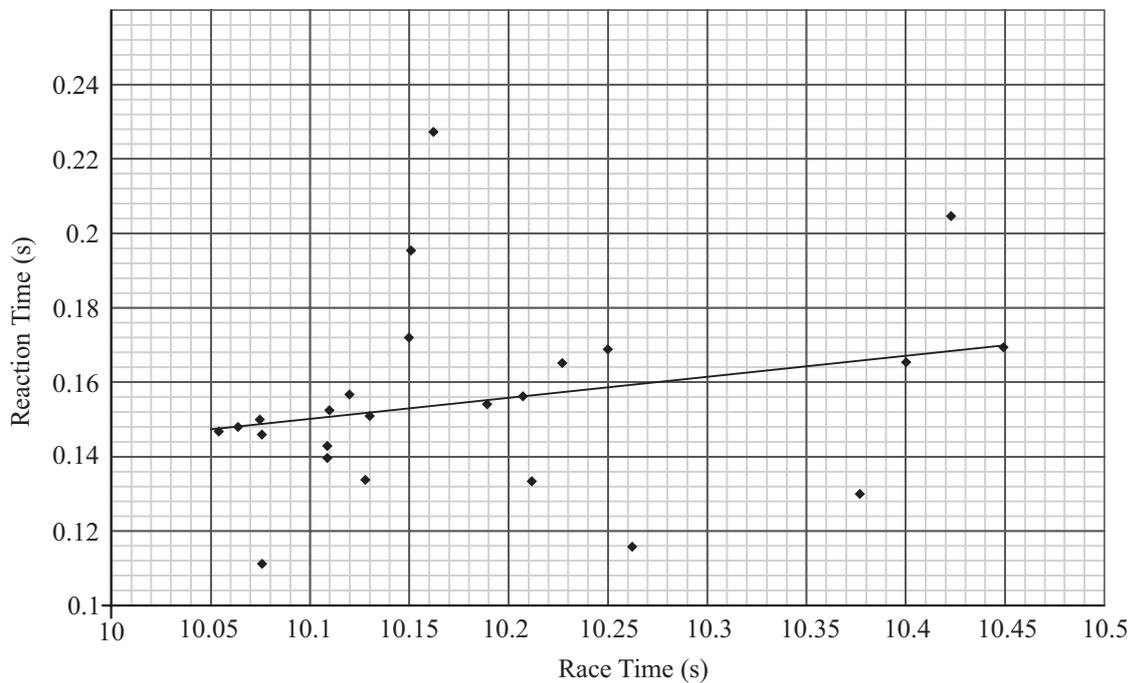
(iv) Find the average score per arrow.



(v) In the Olympic individual competition, the archer shoots 15 arrows. On the above performance history, what score would you expect to shoot for 15 arrows?



(f) The reaction time of an athlete is the time it takes for an athlete to respond to the start signal and to begin leaving the blocks. IAAF policies consider that there is a limit to how fast a human can react to the start signal and has set it at 0.1 seconds (s). So if an athlete leaves the blocks sooner than 0.1 s after the start signal, he or she is deemed to have had a false start. A scatter plot of reaction times versus race times for the 2003 World Championships 100 m Men's Final and Semi-finals is shown.



The average reaction time was 0.156 s with standard deviation 0.0222 s.

(i) How many reaction times were measured?

NUMBER OF REACTION TIMES: _____

Question 8

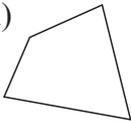
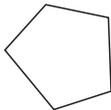
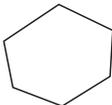
(75 marks)

(a) (i) A triangle is a three-sided polygon. The sum of the three interior angles in a triangle in degrees is _____.

(ii) A triangle with three equal sides and angles is called an _____ triangle.

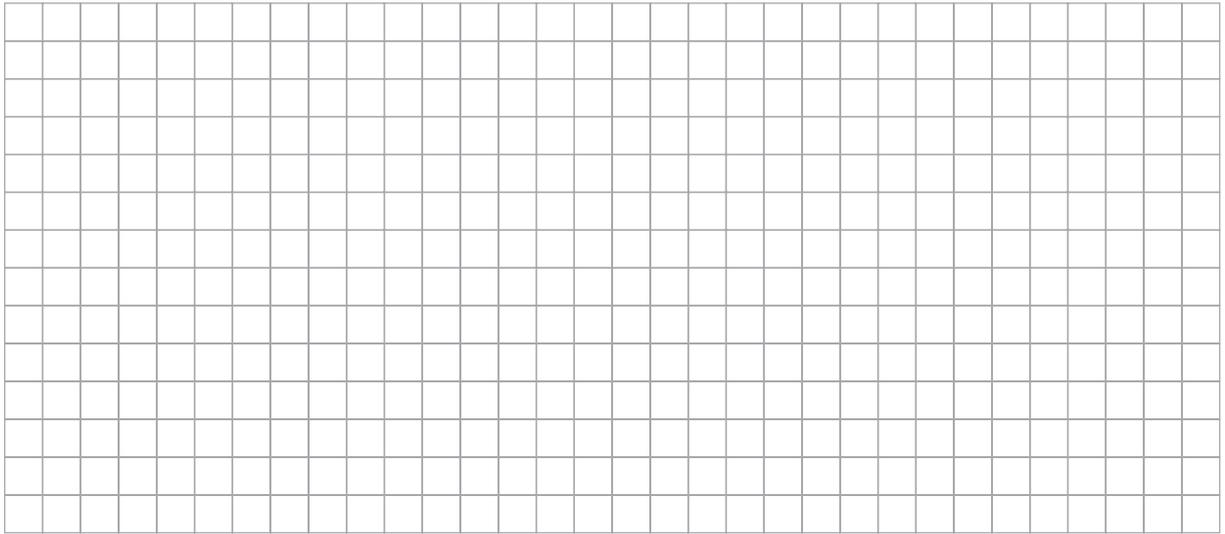
Each angle in degrees in this triangle is equal to _____.

(b) Fill in this table:

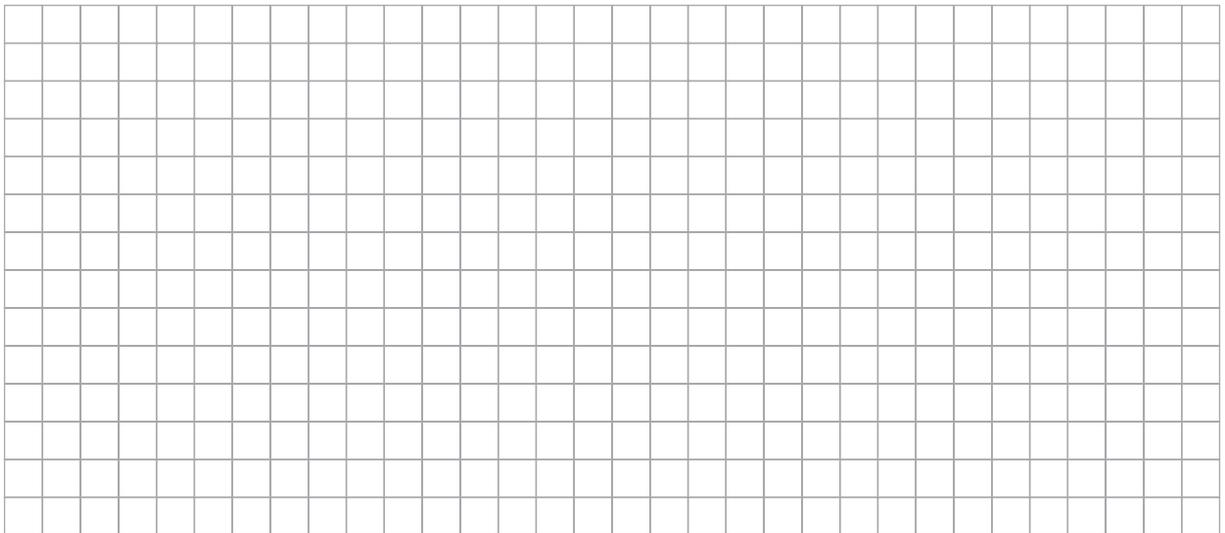
POLYGON	SUM OF THE INTERIOR ANGLES
Three-sided polygon (Triangle) 	
Four-sided polygon (Quadrilateral) 	
Five-sided polygon 	
Six-sided polygon 	



- (iii) Calculate the length of the part of the wall AB , and hence calculate the total perimeter of the flower-bed. Give each answer to one decimal place.



- (iv) Calculate the area of the flower-bed, to one decimal place.



- (v) A 1.5 kg bag of fertiliser costs €3.45 per bag. Joan reckons she needs 0.75 kg of fertiliser per square metre of her flower-bed. How many bags of fertiliser does she need to buy and at what cost?

