Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate Examination 2011

Mathematics
(Project Maths – Phase 1)

Foundation Level

Friday 10 June Afternoon 2:00 – 4:00

300 marks

Examination number

Centre stamp

Running total	

For examiner			
Question	Mark	Question	Mark
1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		Total	

Grade

Instructions

There are nineteen questions on this examination paper. Answer **all** questions.

Questions do not necessarily carry equal marks. To help you manage your time during this examination, a maximum time for each question is suggested. If you remain within these times, you should have about 10 minutes left to review your work.

Write your answers in the spaces provided in this 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 booklet of *Formulae and Tables*. 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:

Question 1 **(suggested maximum time: 2 minutes)**

(a) $34 + 66 =$ _____

(b) $21 \times 57 =$ _____

Question 2 **(suggested maximum time: 5 minutes)**

(a) Write 16·3 correct to the nearest whole number. _____

(b) Write 3·7 correct to the nearest whole number. _____

(c) Use the answers from parts **(a)** and **(b)** to estimate the value of $\frac{16{\cdot}3}{3{\cdot}7}$

$\frac{16{\cdot}3}{3{\cdot}7}$ is approximately equal to $\frac{\square}{\square} = \square$

(d) Using a calculator or otherwise find the value of $\frac{16{\cdot}3}{3{\cdot}7}$ correct to one decimal place.

Question 3 **(suggested maximum time: 5 minutes)**

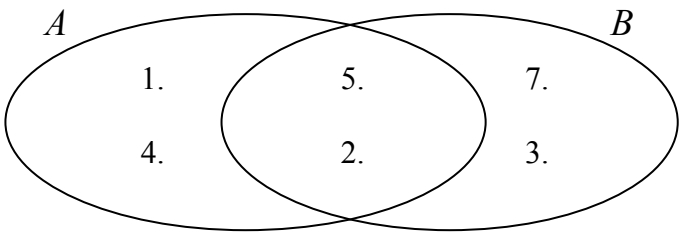
In a restaurant, dinner for an adult costs €25·50 and dinner for a child costs €15.

(a) Find the cost of dinner for two adults and three children.

Adults:	2× €25·50	= €
Children:	3× €15	= €
Total		= €

(b) Dinner is paid for with two €50 notes. How much change should there be?

Question 4 **(suggested maximum time: 2 minutes)**



(i) $B = \{\quad , \quad , \quad , \quad \}$

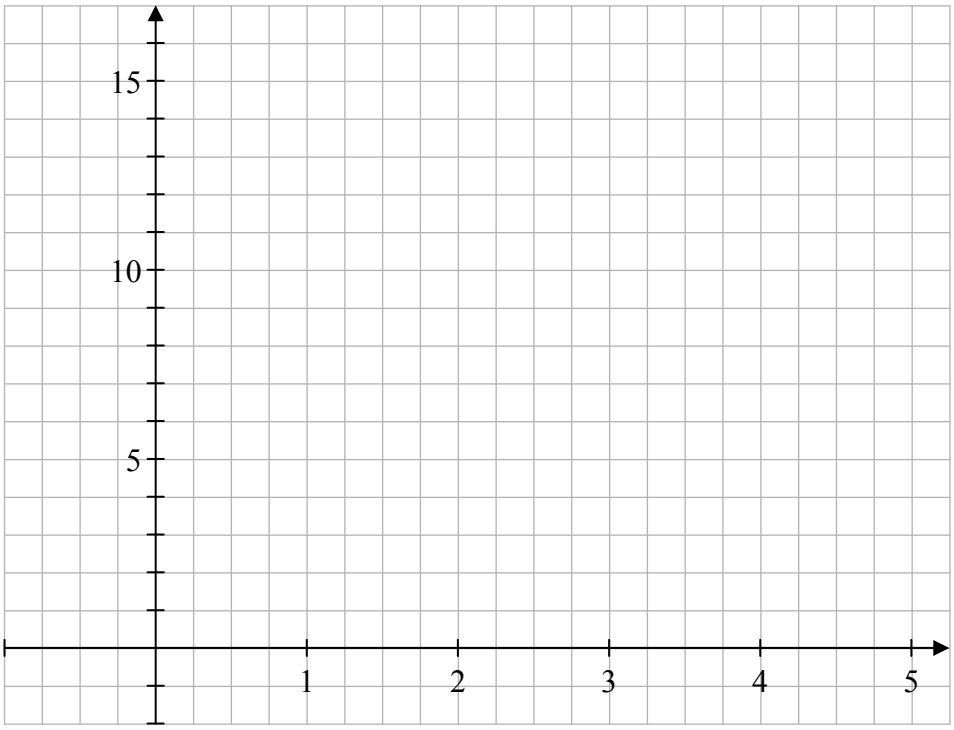
(ii) $A \cup B = \{\quad , \quad , \quad , \quad , \quad , \quad \}$

Question 5 **(suggested maximum time: 10 minutes)**

(a) Given that $y = 2x + 5$, complete the table below. Show all your work.

x	1	2	3	4	5
y			11		

(b) Using your answers from **(a)**, draw the graph of $y = 2x + 5$ from $x = 1$ to $x = 5$.



(c) Use your graph to find the value of y when $x = 3{\cdot}5$.

Work to be shown on the graph and answer to be written here._____.

Question 6 **(suggested maximum time: 10 minutes)**

(a) Find the value of $x^2 + 5x + 2$ when $x = 4$.

(b) Solve for x:

$4(x - 2) = 28$

Question 7 **(suggested maximum time: 5 minutes)**

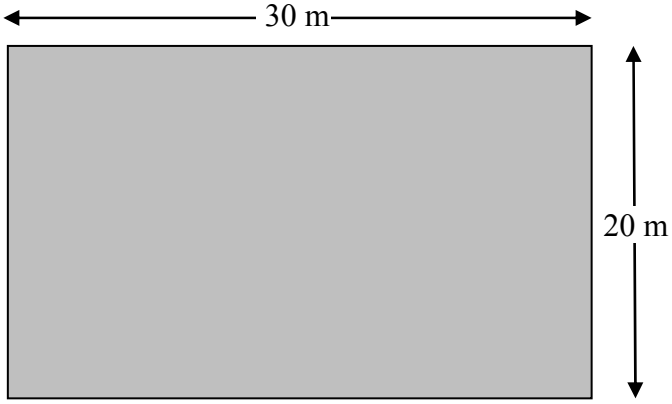
A piece of wood is 3·65 metres in length.

(a) Given that 1 metre = 100 cm, write down the length of the piece of wood in centimetres.

(b) This piece of wood is cut in two. The longer piece is 195 cm long. Calculate the length of the shorter piece in cm.

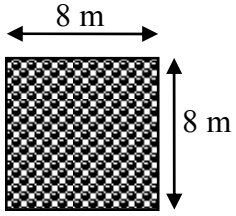
Question 8 **(suggested maximum time: 5 minutes)**

A rectangular garden is 30 metres long and 20 metres wide.



(a) Find the area of the garden in m^2.

(b) A square flowerbed is dug in the garden. The side of the flowerbed is 8 metres long. Find the area of the flowerbed in m^2.



(c) The rest of the garden is covered in grass. Find the area under grass in m^2.

Question 9 **(suggested maximum time: 5 minutes)**

(a) A table in a furniture store was bought for €500. It was sold for €700. Calculate the percentage profit on the cost price.

Selling Price =

Cost Price = _____

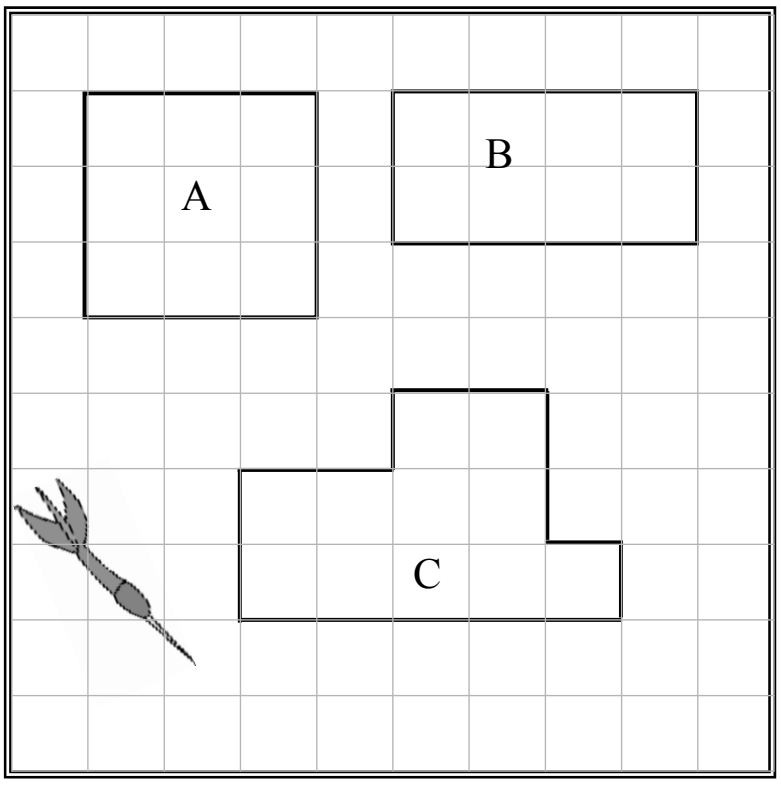
Profit =

Percentage Profit

(b) Another table in the store is priced at €800. The price will be reduced by 20% in a sale. Calculate the sale price.

Question 10 **(suggested maximum time: 5 minutes)**

The diagram shows a 10 cm by 10 cm target in a computerised dart game. It contains three shapes, a square A of side 3 cm, a rectangle B measuring 4 cm by 2 cm and a shape C. The dart always lands inside one of the 1 cm squares in the target. It is equally likely to land in any of the squares.



(a) How many 1 cm squares are in the target?

(b) How many 1 cm squares are in shape C?

(c) In the game a dart is thrown at the target and lands at random on one of the squares. Find the probability that the dart lands in shape C.

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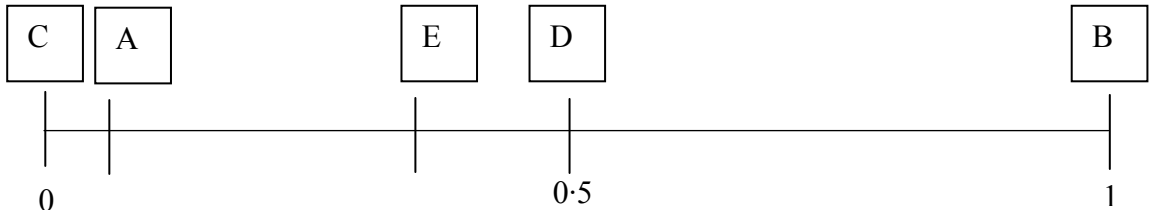
(d) Find the probability that the dart does not land inside any of the three shapes A, B or C.

Question 11 **(suggested maximum time: 5 minutes)**

The probability that each of the events A, B, C, D and E will happen is shown on the probability scale below.



The statements below refer to three of these events. Place one of the events A, B, C, D or E beside the statement that best describes it.

	Event
This event is certain to happen.	
This event is very unlikely to happen.	
This event has a 50% chance of happening.	

Question 12 **(suggested maximum time: 10 minutes)**

The number of planning permissions approved for new houses and apartments in Ireland (to the nearest thousand) from 2006 to 2009 is shown in the table below.

Number of Planning Permissions Approved			
Year	Houses	Apartments	Total (Units)
2006	60 000	19 000	
2007	63 000	22 000	
2008	48 000	20 000	
2009	27 000	14 000	

Source: Central Statistics Office

(a) Complete the table to show the total number of units approved each year.

(b) How many fewer units were approved in 2009 compared to 2007?

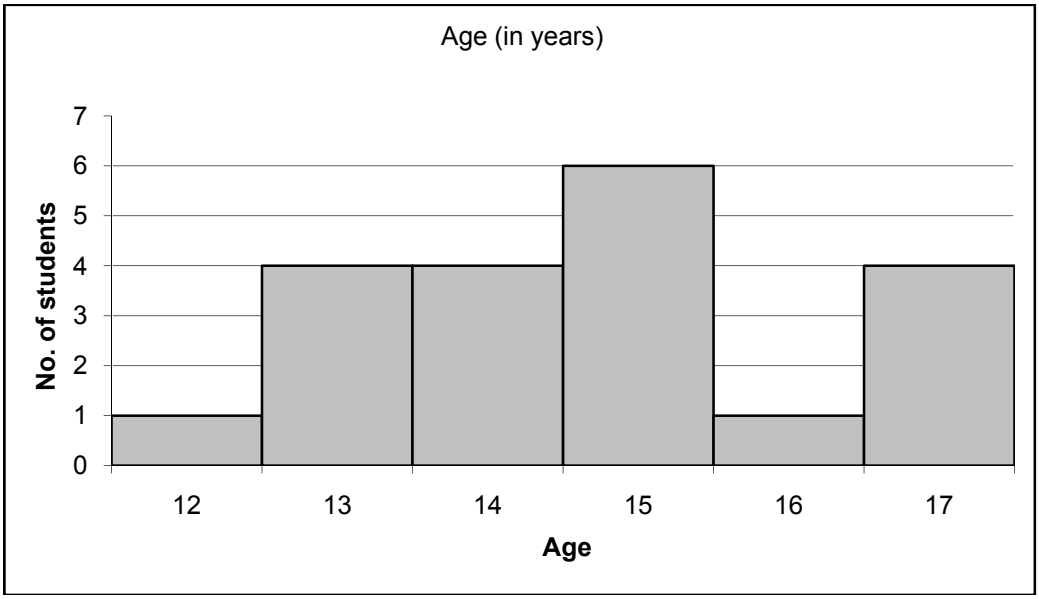
(c) Calculate the percentage decrease in the total number of approvals between 2007 and 2009. Give your answer correct to two decimal places.

$$\frac{\text{Decrease}}{\text{Total Units (2007)}} \times \frac{100}{1} =$$

(d) In which year did the largest decrease in the number of approvals take place when compared to the previous year?

Question 13 **(suggested maximum time: 5 minutes)**

The ages of a random sample of students who completed the *CensusAtSchool* survey in 2010 are shown in the chart below.



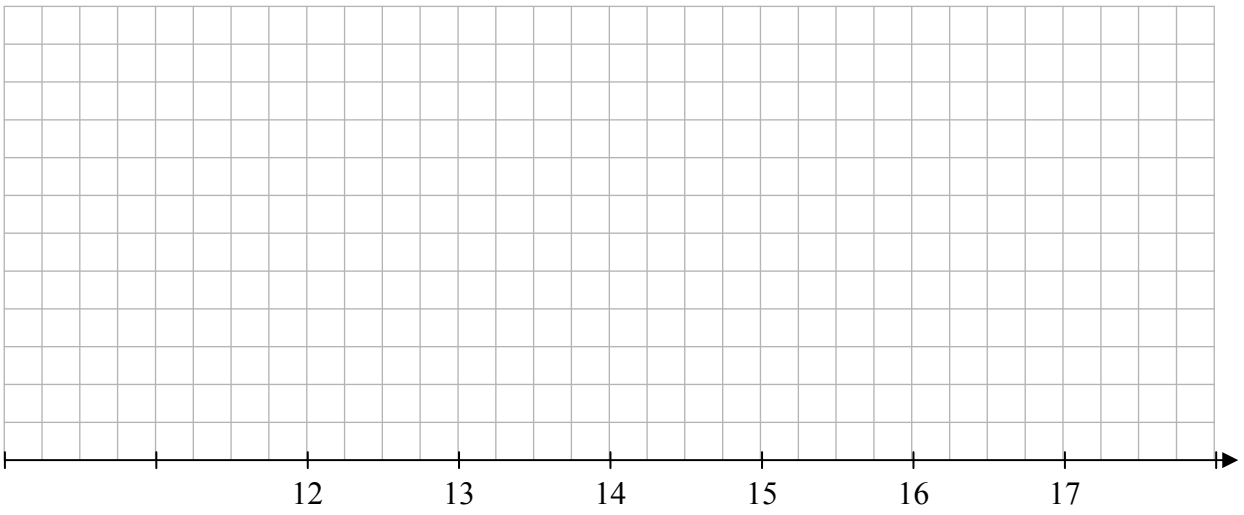
(a) How many students were in the sample?

(b) The **mode** of the data is _____ and the **range** of the data is _____.

(c) How many students were younger than 15 years of age? _____

(d) What is the probability that a student chosen at random from this group is 17 years of age?

(e) Represent the above data on a line plot.



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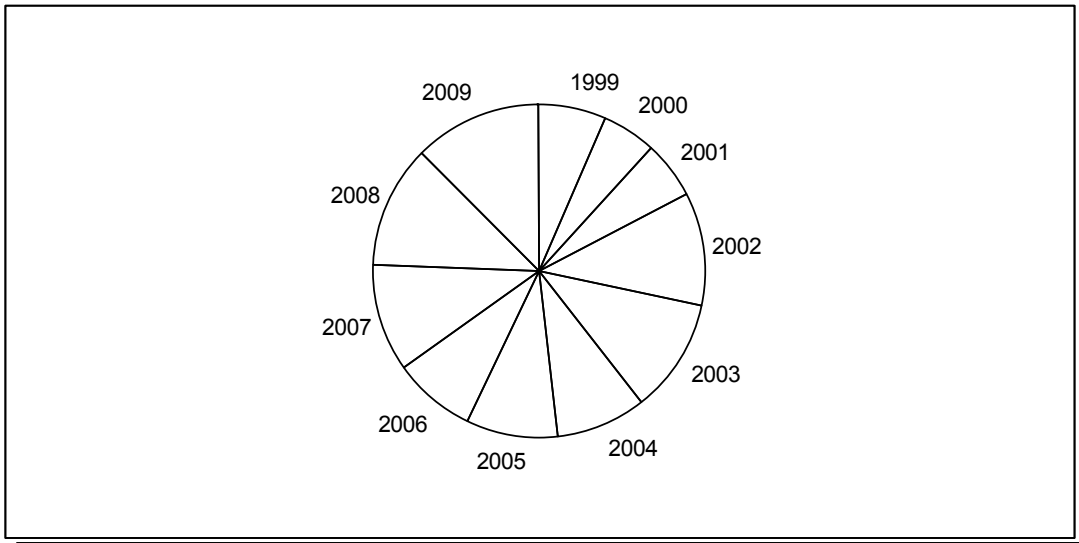
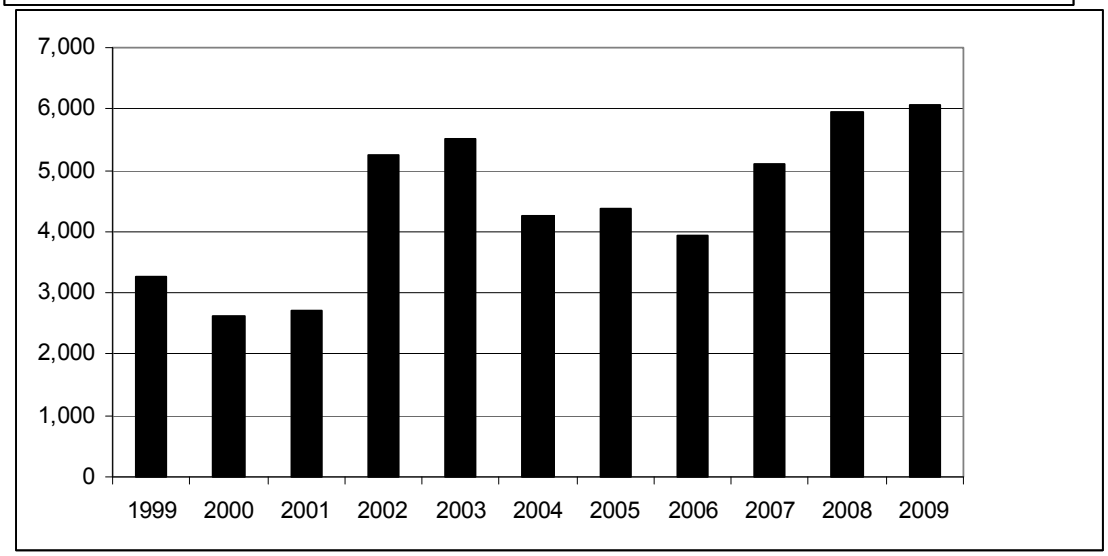
Question 14 **(suggested maximum time: 5 minutes)**

The number of dog licences issued by Wicklow County Council from 1999 to 2009 is shown in the *pie chart* and in the *bar chart* below.



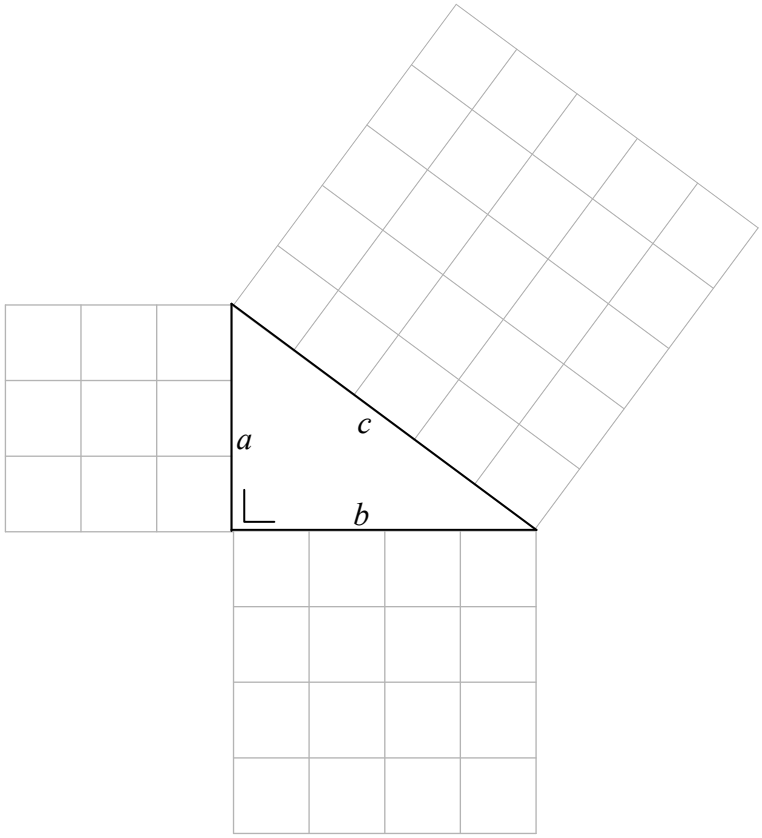


(a) Give two reasons why the bar chart is a better way of showing the data than the pie chart.

(b) Mary is looking at the bar chart. She points to one part of the graph and says, "that is interesting, I wonder why that happened." What part of the graph do you think Mary is talking about? Give a reason for your answer.

Question 15 **(suggested maximum time: 5 minutes)**

The diagram shows a right angled triangle with a square drawn on each side. Each small square box is 1 cm in length.



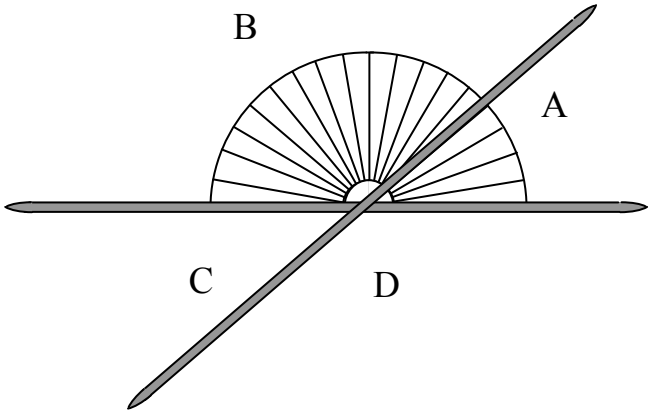
(a) State the length of each side of the triangle. $a =$ _____ $b =$ _____ $c =$ _____

(b) Explain how the diagram can be used to demonstrate that the Theorem of Pythagoras can be applied to this triangle.

(c) Find the area of the triangle.

Question 16 **(suggested maximum time: 5 minutes)**

The diagram below shows two plastic strips, pinned at their mid points, and a protractor.



(a) From the diagram estimate the size of the angle A. _____

(b) Use your estimate to calculate the size of angle B.

(c) Complete $|\angle B| + |\angle C| =$ _____

(d) State the relationship between angle A and angle C. Give a reason for your answer.

Question 17 **(suggested maximum time: 5 minutes)**

(a) Complete the table below. Give each answer correct to four decimal places.

A	$\sin A$	$\cos A$
30°		
45°		
60°		

Use the values from the table to complete the statements below.

(b) If $A =$ _____, then $\sin A = \cos A$

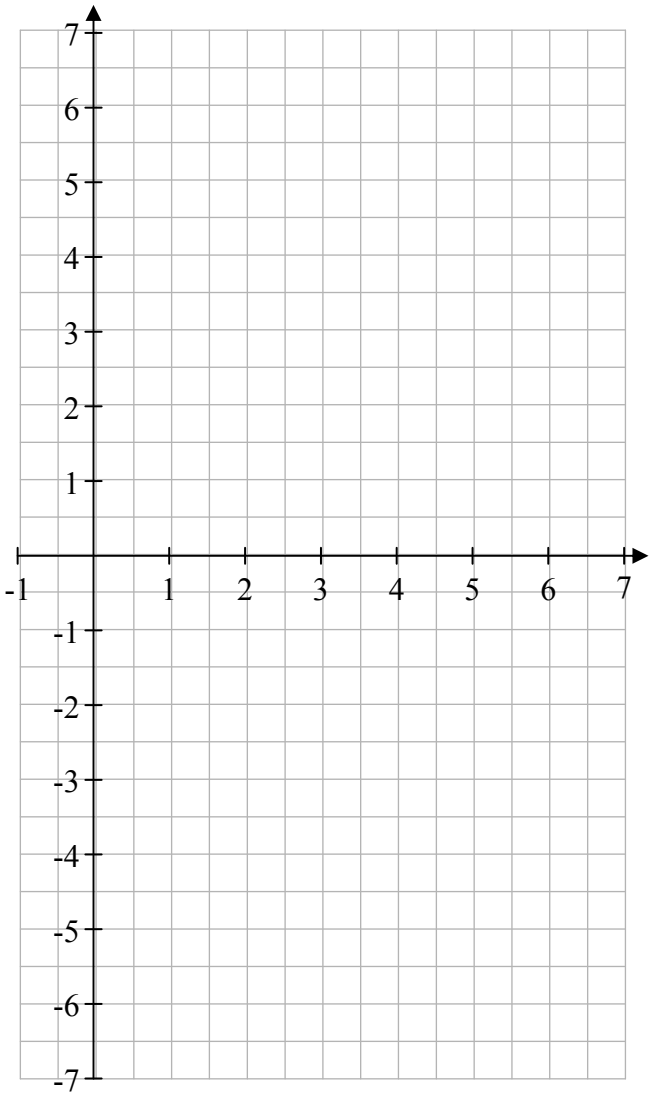
(c) If $A =$ _____, then $\sin A < \cos A$

(d) If $A =$ _____, then $\sin A > \cos A$

(e) As A gets bigger, _____ gets smaller.

Question 18 **(suggested maximum time: 10 minutes)**

(a) Plot the points $A(1, 1)$, $B(5, 1)$ and $C(3, 6)$ on the co-ordinate plane below.



(b) Join the three points to form a triangle.

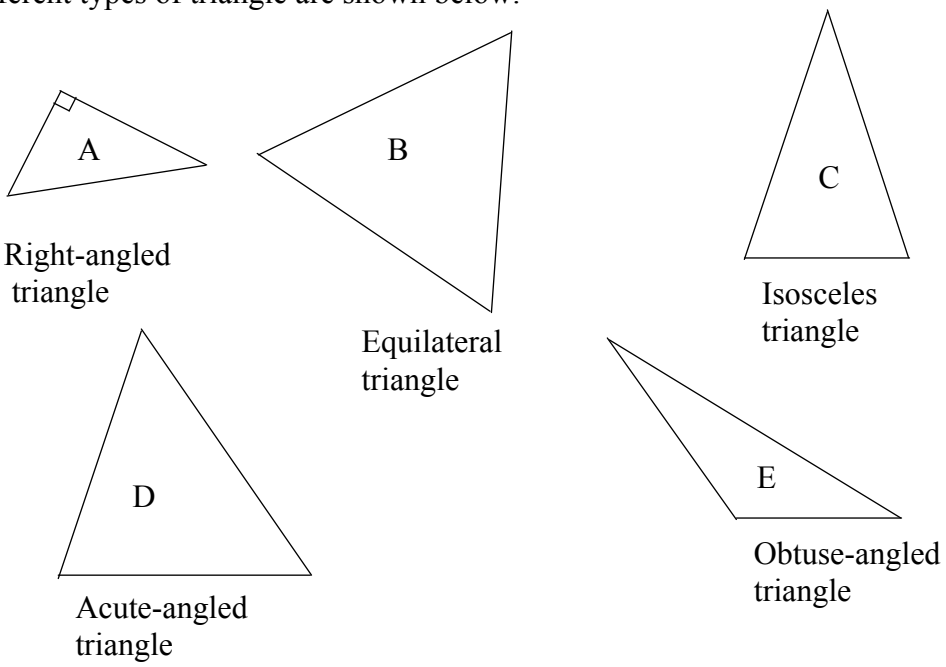
(c) On your diagram, draw the axis of symmetry of the triangle.

(d) On your diagram, draw the image of the triangle under an axial symmetry in the x axis.

(e) Find the slope of AC.

Question 19 **(Suggested maximum time: 5 minutes)**

Five different types of triangle are shown below.



For each statement below, tick (✓) the boxes to show the types of triangle for which the statement is always true.

	A	**B**	**C**	**D**	**E**
The three angles add up to 180°					
One angle is greater than 90°					
All three angles are equal					
Exactly two sides are equal					
No angle is greater than or equal to 90°					
Two angles added together could add up to less than 90°					

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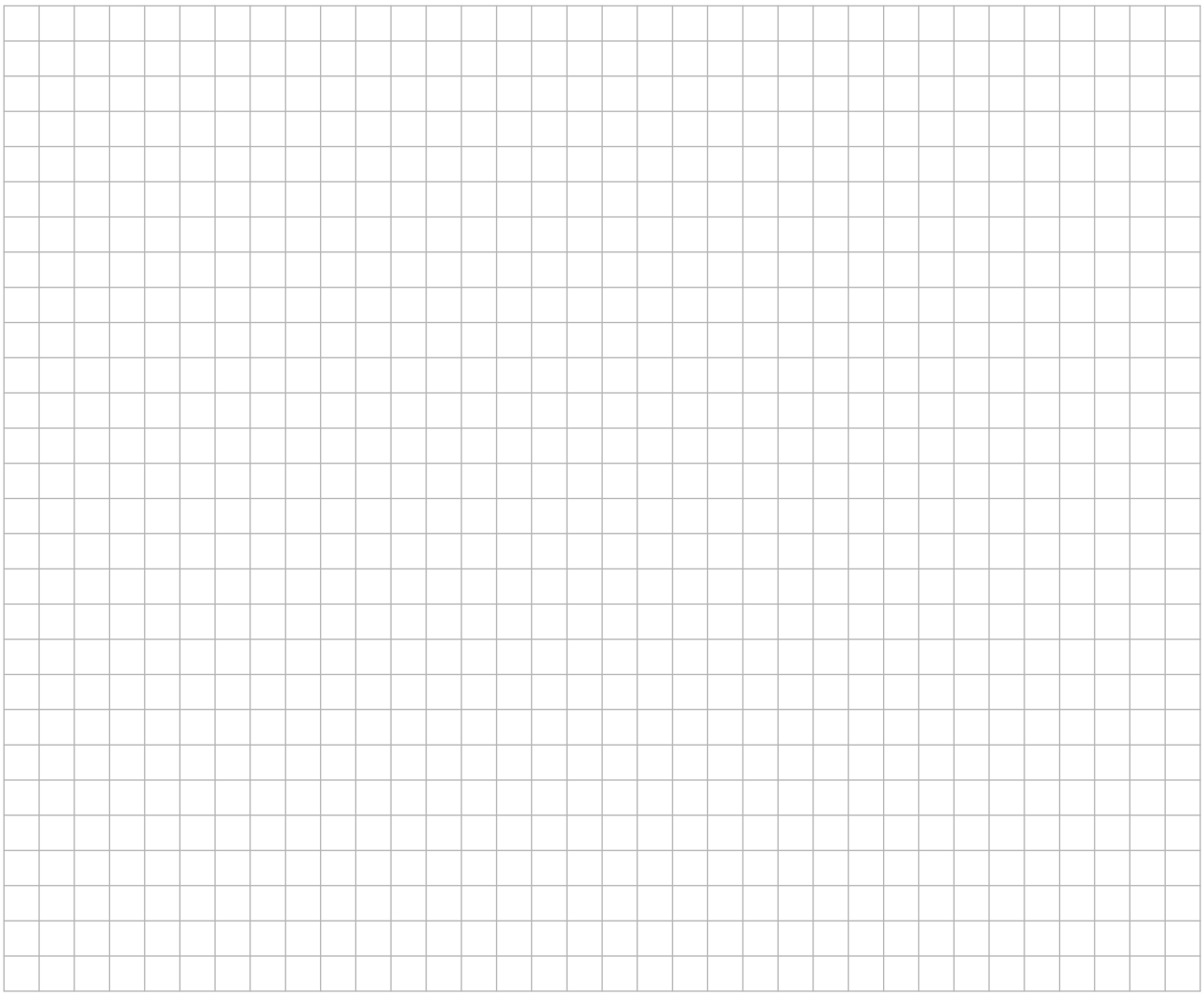

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