Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/41**

Paper 4 (Extended) **October/November 2019**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

This document consists of **16** printed pages.

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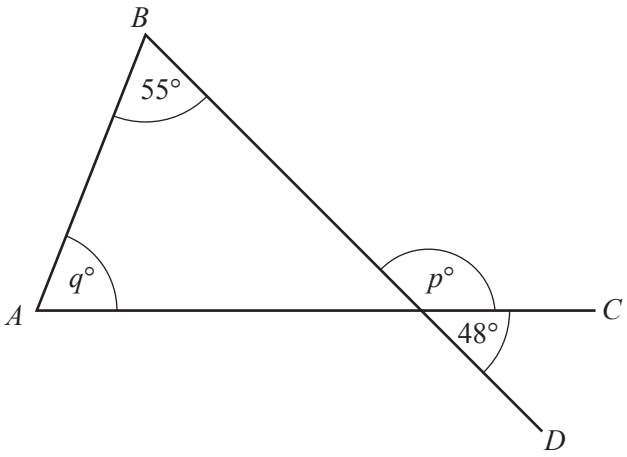
1 **(a)**



NOT TO SCALE

View solution

In the diagram, AC and BD are straight lines.

Find the value of p and the value of q.

$p =$ .....

$q =$ ..... [3]

(b) The angles of a quadrilateral are $x°$, $(x+5)°$, $(2x-25)°$ and $(x+10)°$.

View solution

Find the value of x.

$x =$ ..... [3]

(c) A regular polygon has 72 sides.

View solution

Find the size of an interior angle.

..... [3]

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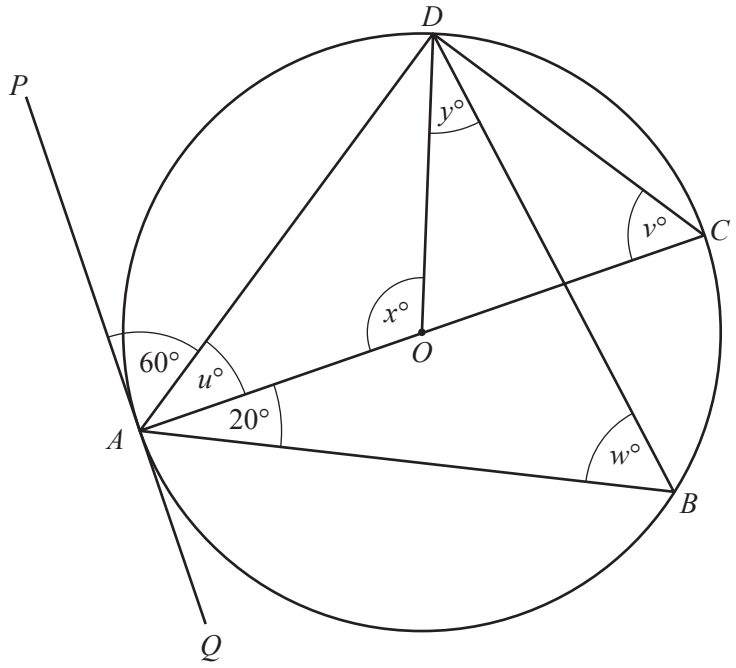
(d)

View solution



NOT TO SCALE

A, B, C and D lie on the circle, centre O, with diameter AC.
PQ is a tangent to the circle at A.
Angle $PAD = 60°$ and angle $BAC = 20°$.

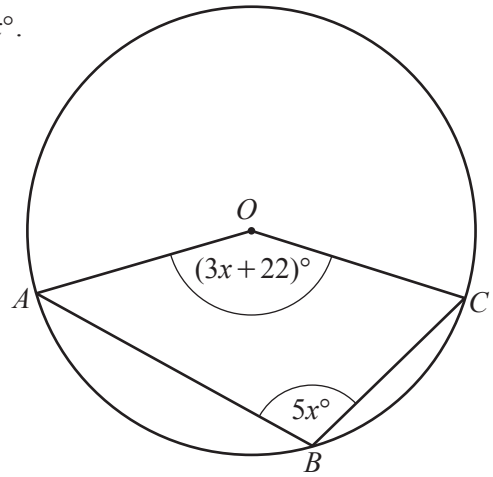
Find the values of u, v, w, x and y.

$u =$ ....., $v =$ ....., $w =$ ....., $x =$ ....., $y =$ ..... [6]

(e) A, B and C lie on the circle, centre O.
Angle $AOC = (3x + 22)°$ and angle $ABC = 5x°$.

Find the value of x.

View solution



NOT TO SCALE

$x =$ ..... [4]

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2 **(a)** Ali and Mo share a sum of money in the ratio Ali : Mo = 9 : 7.
Ali receives $600 more than Mo.

View solution

Calculate how much each receives.

Ali $ .....

Mo $ ..... [3]

(b) In a sale, Ali buys a television for $195.80 .
The original price was $220.

View solution

Calculate the percentage reduction on the original price.

..... % [3]

(c) In the sale, Mo buys a jacket for $63.
The original price was reduced by 25%.

View solution

Calculate the original price of the jacket.

$ ..... [3]

3 **(a)** Dina invests \$600 for 5 years at a rate of 2% per year compound interest.

View solution

Calculate the value of this investment at the end of the 5 years.

\$ ..... [2]

(b) The value of a gold ring increases exponentially at a rate of 5% per year.
The value is now \$882.

View solution

(i) Calculate the value of the ring 2 years ago.

\$ ..... [2]

(ii) Find the number of complete years it takes for the ring's value of \$882 to increase to a value greater than \$1100.

View solution

..... [2]

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4 **(a)** **(i)** Calculate the **external curved** surface area of a cylinder with radius 8 m and height 19 m.

View solution

..... m^2 [2]

(ii) This surface is painted at a cost of \$0.85 per square metre.

View solution

Calculate the cost of painting this surface.

\$ ..... [2]

(b) A solid metal sphere with radius 6 cm is melted down and all of the metal is used to make a solid cone with radius 8 cm and height h cm.

View solution

(i) Show that $h = 13.5$.

[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

[2]

(ii) Calculate the slant height of the cone.

View solution

..... cm [2]

(iii) Calculate the curved surface area of the cone.
[The curved surface area, A, of a cone with radius r and slant height l is $A = \pi r l$.]

View solution

..... cm^2 [1]

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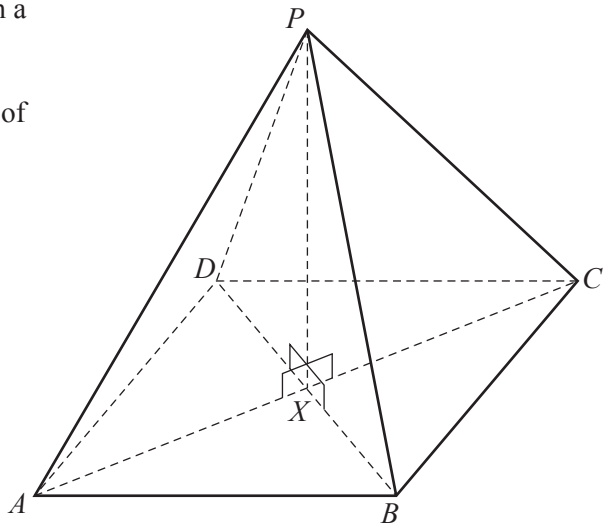
(c) Two cones are mathematically similar.
The total surface area of the smaller cone is $80\,cm^2$.
The total surface area of the larger cone is $180\,cm^2$.
The volume of the smaller cone is $168\,cm^3$.

View solution

Calculate the volume of the larger cone.

..... cm^3 [3]

(d) The diagram shows a pyramid with a square base $ABCD$.
$DB = 8\,cm$.
P is vertically above the centre, X, of the base and $PX = 5\,cm$.



NOT TO SCALE

View solution

Calculate the angle between PB and the base $ABCD$.

..... [3]

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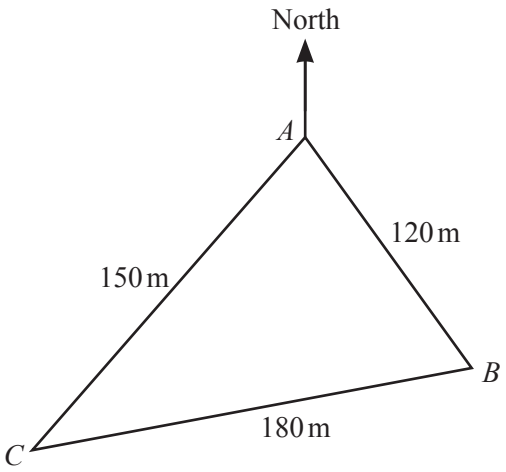
5



NOT TO SCALE

The diagram shows a triangular field, ABC, on horizontal ground.

(a) Olav runs from A to B at a constant speed of 4 m/s and then from B to C at a constant speed of 3 m/s.
He then runs at a constant speed from C to A.
His average speed for the whole journey is 3.6 m/s.

View solution

Calculate his speed when he runs from C to A.

..... m/s [3]

(b) Use the cosine rule to find angle BAC.

View solution

Angle BAC = ... [4]

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(c) The bearing of C from A is 210°.

(i) Find the bearing of B from A.

View solution

..... [1]

(ii) Find the bearing of A from B.

View solution

..... [2]

(d) D is the point on AC that is nearest to B.

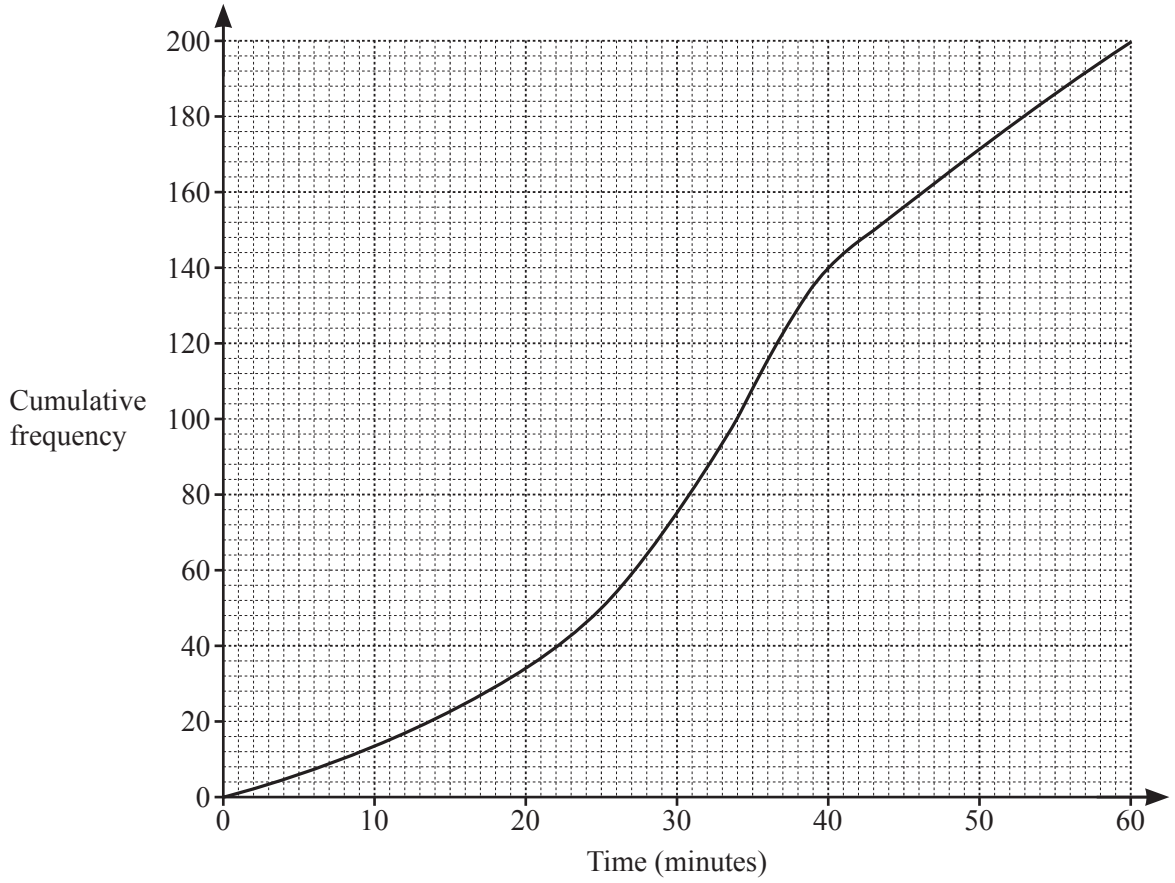
Calculate the distance from D to A.

View solution

..... m [2]

6 **(a)** The cumulative frequency diagram shows information about the times taken by 200 students to solve a problem.

View solution



Use the cumulative frequency diagram to find an estimate for

(i) the median, ... min [1]

(ii) the interquartile range,

View solution

..... min [2]

(iii) the number of students who took more than 40 minutes.

View solution

..... [2]

(b) Roberto records the value of each of the coins he has at home. The table shows the results.

View solution

Value (cents)	1	2	5	10	20	50
Frequency	3	1	3	2	4	2

(i) Find the range. ..... cents [1]

(ii) Find the mode. ..... cents [1]

(iii) Find the median.

..... cents [1]

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(iv) Work out the total value of Roberto's coins.

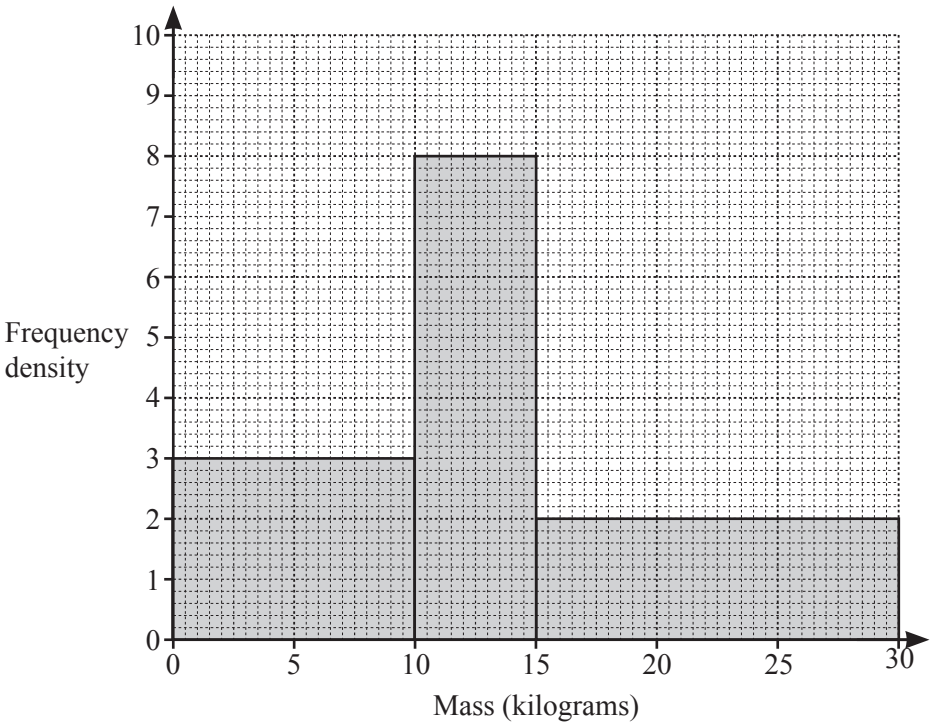
..... cents [2]

(v) Work out the mean.

..... cents [1]

(c) The histogram shows information about the masses of 100 boxes.

View solution



Calculate an estimate of the mean.

..... kg [6]

7 **(a)** Oranges cost 21 cents each.
Alex buys x oranges and Bobbie buys $(x+2)$ oranges.
The total cost of these oranges is \$4.20 .

View solution

Find the value of x.

$x =$ ..... [3]

(b) The cost of one ruler is r cents.
The cost of one protractor is p cents.

View solution

The total cost of 5 rulers and 1 protractor is 245 cents.
The total cost of 2 rulers and 3 protractors is 215 cents.

Write down two equations in terms of r and p and solve these equations to find the cost of one protractor.

..... cents [5]

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(c) Carol walks 12 km at x km/h and then a further 6 km at $(x-1)$ km/h.
The total time taken is 5 hours.

View solution

(i) Write an equation, in terms of x, and show that it simplifies to $5x^2 - 23x + 12 = 0$.

[3]

(ii) Factorise $5x^2 - 23x + 12$.

View solution

..... [2]

(iii) Solve the equation $5x^2 - 23x + 12 = 0$.

View solution

$x =$ ..... or $x =$ ..... [1]

(iv) Write down Carol's walking speed during the final 6 km.

View solution

..... km/h [1]

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8



The diagram shows 5 cards.

(a) Donald chooses a card at random.

View solution

(i) Write down the probability that the number of dots on this card is an even number.

..... [1]

(ii) Write down the probability that the number of dots on this card is a prime number.

View solution

..... [1]

(b) Donald chooses two of the five cards at random, without replacement.
He works out the total number of dots on these two cards.

View solution

(i) Find the probability that the total number of dots is 5.

..... [3]

(ii) Find the probability that the total number of dots is an odd number.

View solution

..... [3]

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9 A car hire company has x small cars and y large cars.
The company has at least 6 cars in total.
The number of large cars is less than or equal to the number of small cars.
The largest number of small cars is 8.

(a) Write down three inequalities, in terms of x and/or y, to show this information.

View solution

..... , ... , ... [3]

(b) A small car can carry 4 people and a large car can carry 6 people.
One day, the largest number of people to be carried is 60.

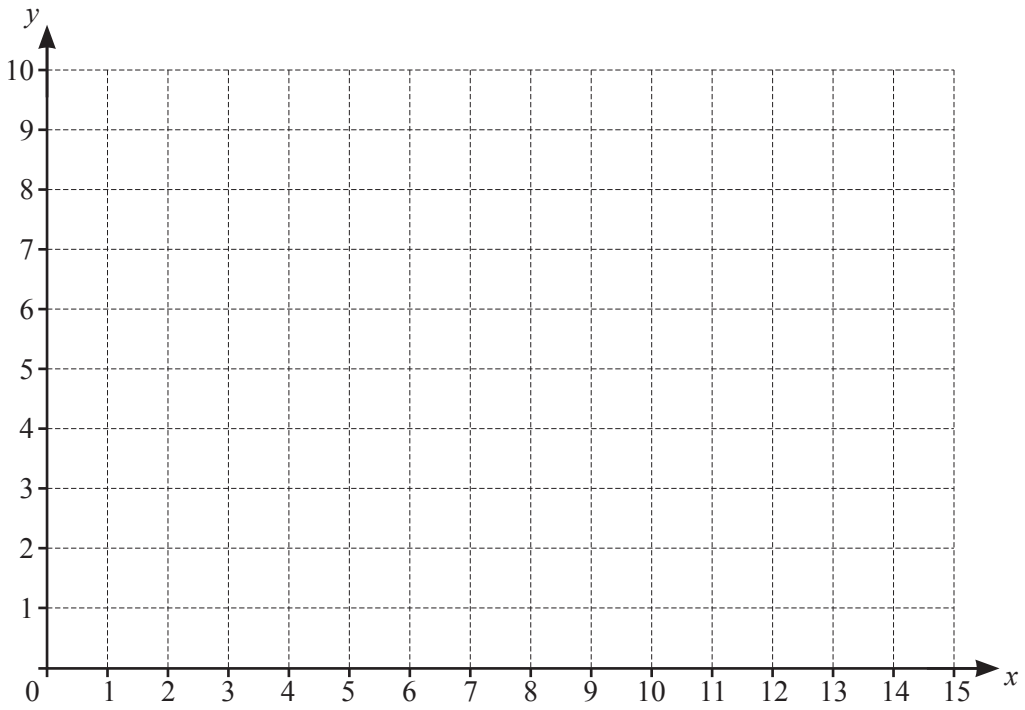
View solution

Show that $2x + 3y \leqslant 30$.

[1]

(c)

View solution



By shading the **unwanted** regions on the grid, show and label the region R that satisfies all four inequalities. [6]

(d) **(i)** Find the number of small cars and the number of large cars needed to carry exactly 60 people.

View solution

..... small cars, ... large cars [1]

(ii) When the company uses 7 cars, find the largest number of people that can be carried.

View solution

..... [2]

Question 10 is printed on the next page.

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10 **(a)** Complete the table for the 5th term and the nth term of each sequence.

View solution

1st term	2nd term	3rd term	4th term	5th term		nth term
9	5	1	−3			
4	9	16	25			
1	8	27	64			
8	16	32	64			

[11]

(b) 0, 1, 1, 2, 3, 5, 8, 13, 21, …

View solution

This sequence is a Fibonacci sequence.
After the first two terms, the rule to find the next term is "add the two previous terms".
For example, $5 + 8 = 13$.

Use this rule to complete each of the following Fibonacci sequences.

2 4 ....

1 11

..... −1 1

[3]

(c) $\frac{1}{3}$, $\frac{3}{4}$, $\frac{4}{7}$, $\frac{7}{11}$, $\frac{11}{18}$, …

View solution

(i) One term of this sequence is $\frac{p}{q}$.

Find, in terms of p and q, the next term in this sequence.

..... [1]

(ii) Find the 6th term of this sequence.

..... [1]

View solution

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