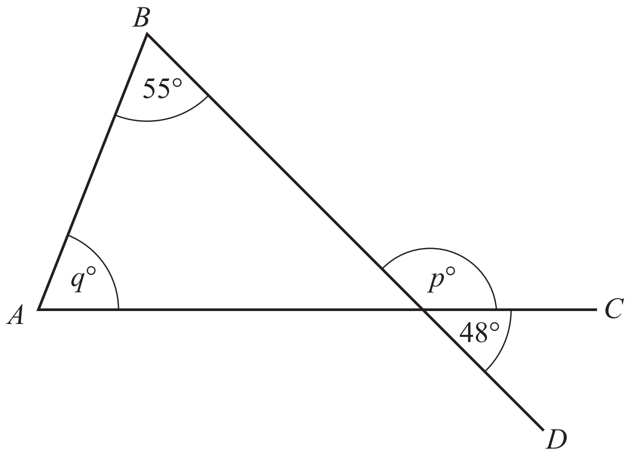
1 **(a)**



NOT TO SCALE

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 $(x+10)°$.

Find the value of x.

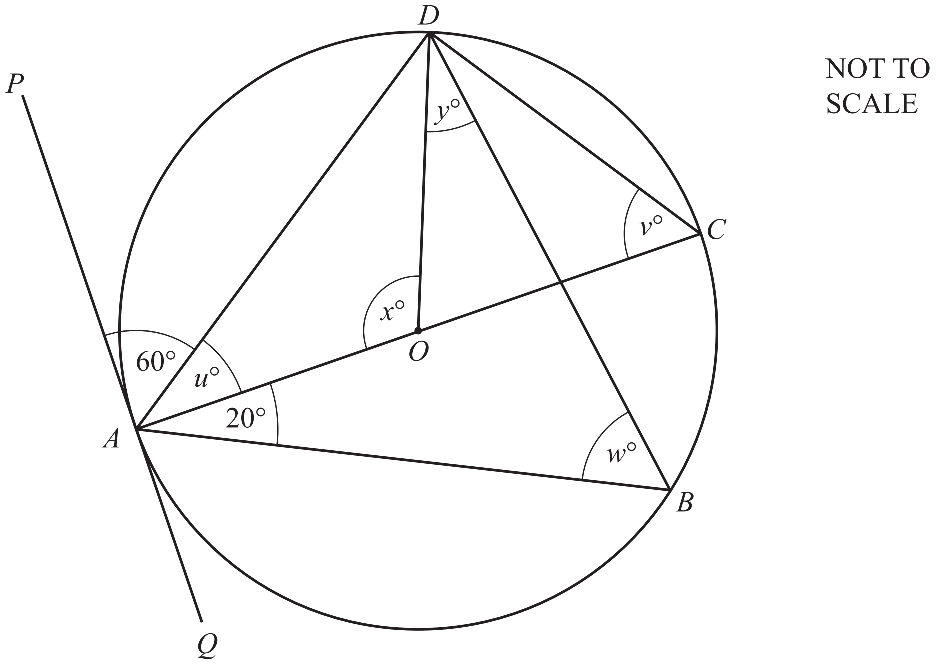
x = ... [3]

(c) A regular polygon has 72 sides.

Find the size of an interior angle.

.... [3]

(d)



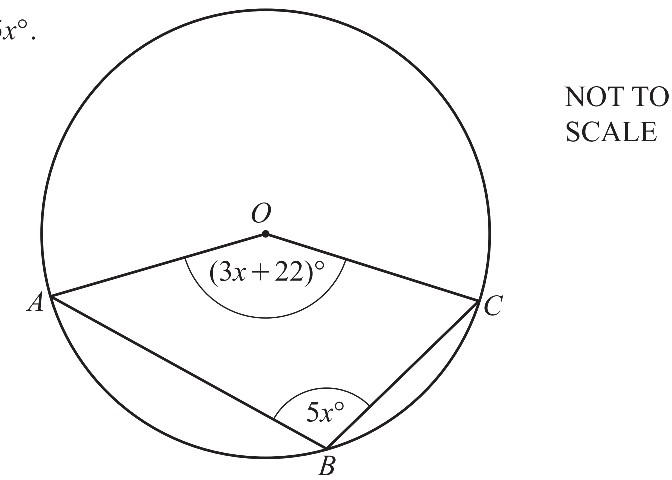
A, B, C and D lie on the circle, centre O, with diameter AC.
PQ is a tangent to the circle at A.
Angle $PAD = 60°$ and angle $BAC = 20°$.

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.



$x =$ .... [4]

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

Calculate how much each receives.

Ali \$ ....

Mo \$ .... [3]

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

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%.

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.

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.

(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.

.... [2]

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

.... m^2 [2]

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

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.

(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.

.... 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 $A = \pi r l$.]

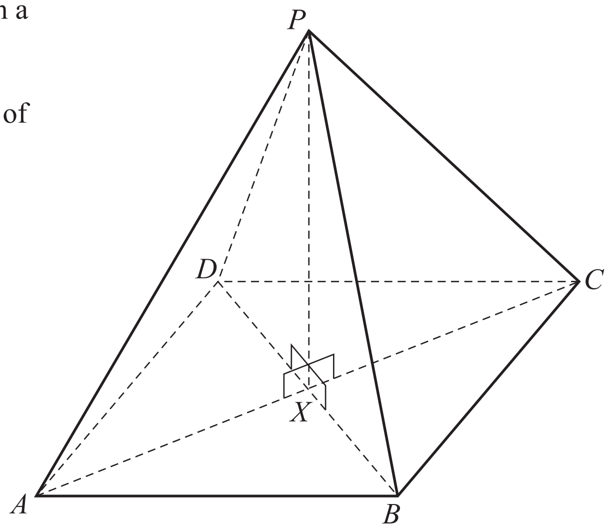
.... cm^2 [1]

(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.

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.

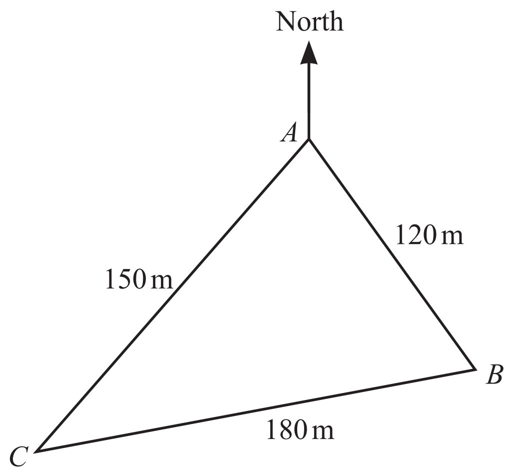


NOT TO SCALE

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

.... [3]

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.

Calculate his speed when he runs from *C* to *A*.

.... m/s [3]

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

Angle *BAC* = ... [4]

(c) The bearing of C from A is 210°.

(i) Find the bearing of B from A.

.... [1]

(ii) Find the bearing of A from B.

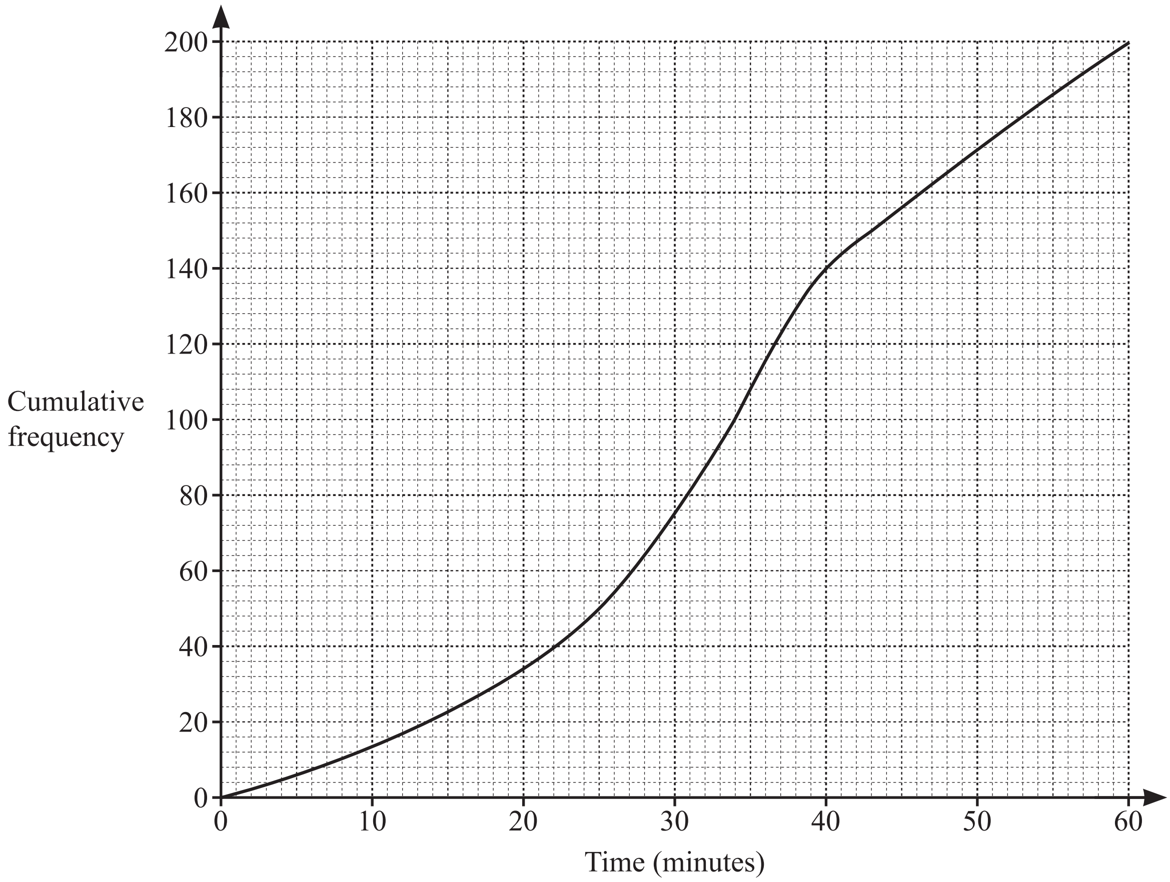
.... [2]

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

Calculate the distance from D to A.

.... m [2]

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



Use the cumulative frequency diagram to find an estimate for

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

(ii) the interquartile range,

.... min [2]

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

.... [2]

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

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]

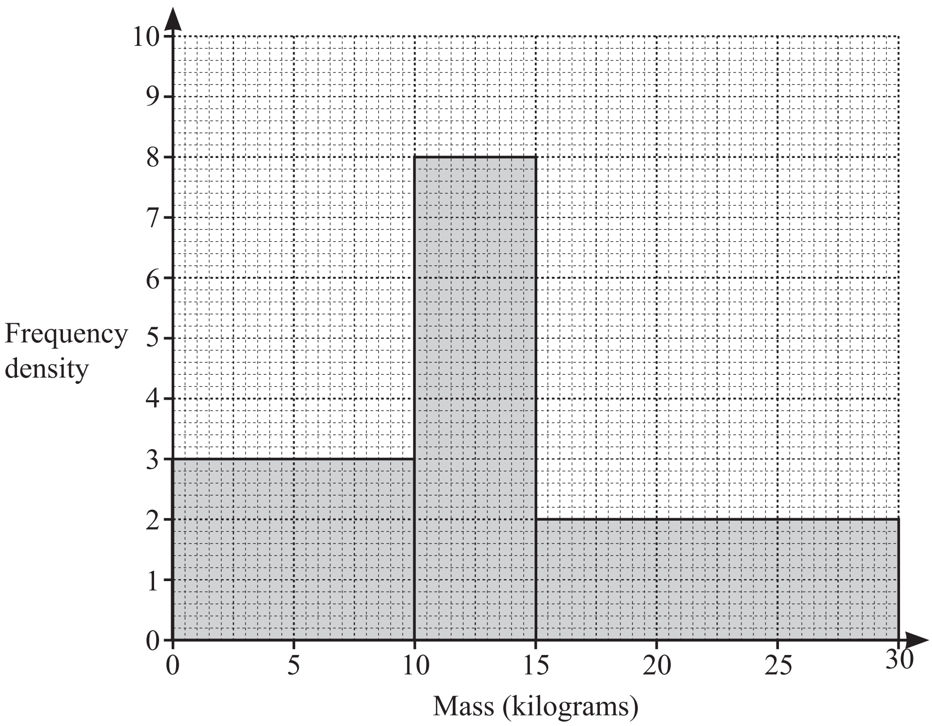
(iv) Work out the total value of Roberto's coins.

.... cents [2]

(v) Work out the mean.

.... cents [1]

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



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 .

Find the value of x.

$x =$ .... [3]

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

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]

(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.

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

[3]

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

.... [2]

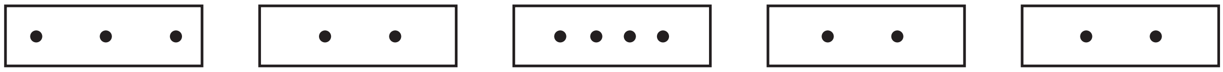
(iii) Solve the equation $5x^2 - 23x + 12 = 0$.

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

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

.... km/h [1]

8



The diagram shows 5 cards.

(a) Donald chooses a card at random.

(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.

.... [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.

(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.

.... [3]

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.

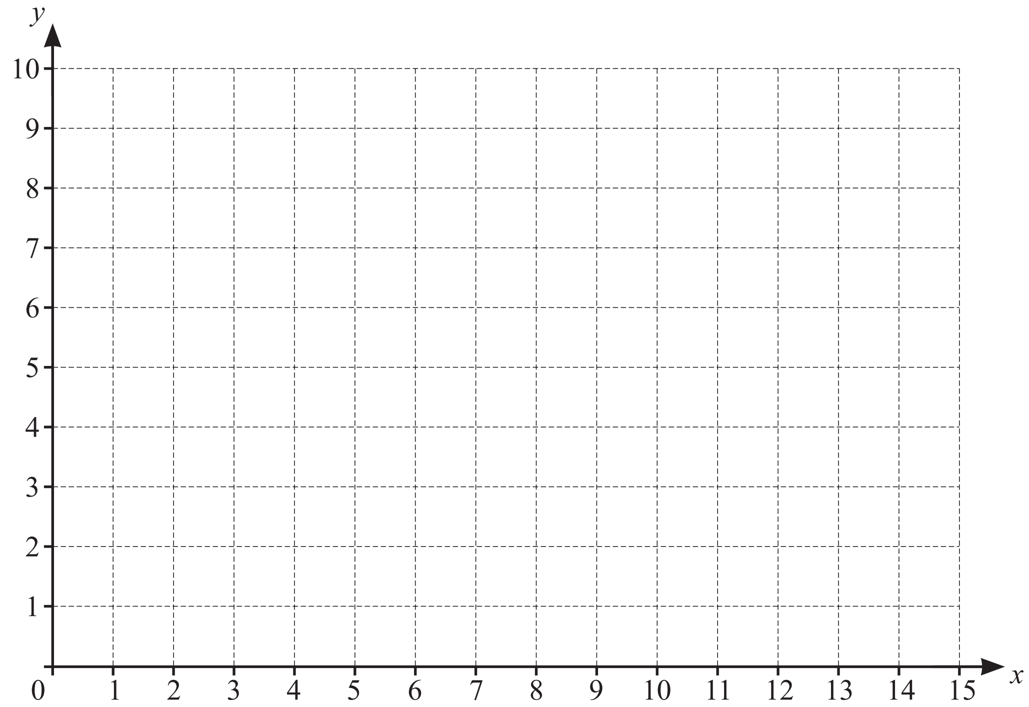
.... , ... , ... [3]

(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.

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

[1]

(c)



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.

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

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

.... [2]

Question 10 is printed on the next page.

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

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, …

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

(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]