Intermediate 2 – Revision
Unit 1

1. Calculate the compound interest on £2800 at a rate of 6.2% pa for a period of 5 years.

2. Michael invests £6500 in the shares of a chemical company. The shares are expected to grow at an annual rate of 7%. Calculate how much Michael's shares should be worth in 10 years time.
   Give your answer correct to 2 significant figures.

3. The number of Great White sharks in the Indian Ocean is estimated to be 35 000. Due to various factors this number is falling at a rate of 7.2% per annum. Calculate the number of Great White sharks which will be in the Indian Ocean in 4 years time.

4. A farmer buys a tractor costing £72 000. In its first year the tractor depreciates at a rate of 15%. For each of the next three years the tractor depreciates at a rate of 8%.
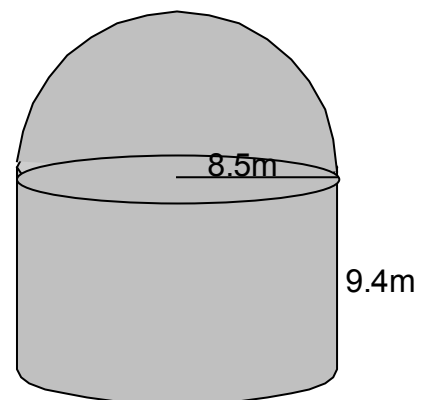   Calculate the value of the tractor after 4 years.

5. The diagram opposite shows a prism. The cross-section of the prism is in the form of a rectangle and a semi-circle.

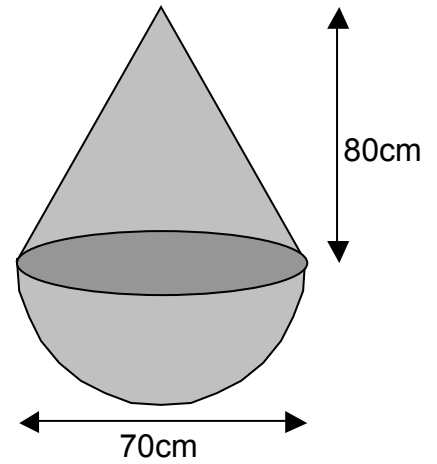   Calculate the volume of this prism.

12 cm

32 cm

18 cm
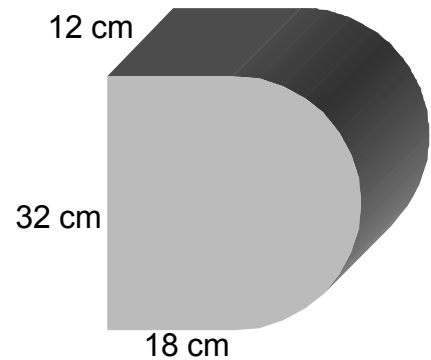
6. A storage barn is in the shape of a cylinder with a hemisphere on top.

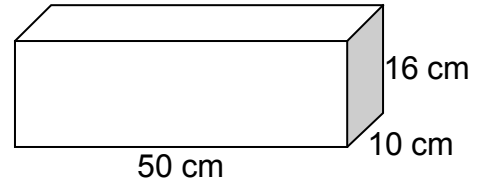   Calculate the volume of the storage barn.

8.5m

9.4m

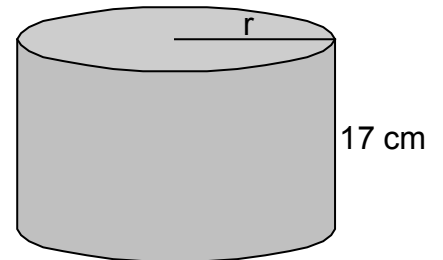**7.** A buoy is in the shape of a hemisphere with a cone on top, as shown opposite.
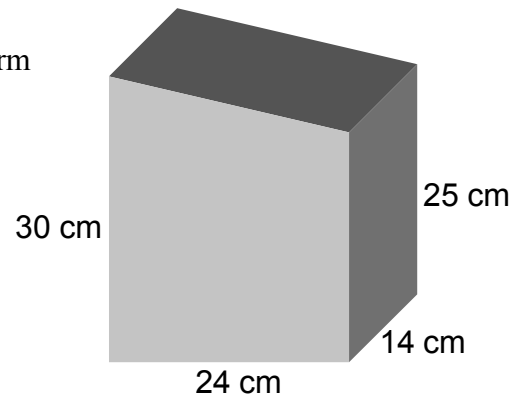
Calculate the volume of this buoy.

80cm

70cm

8. (a) Find the volume of the cuboid shown.
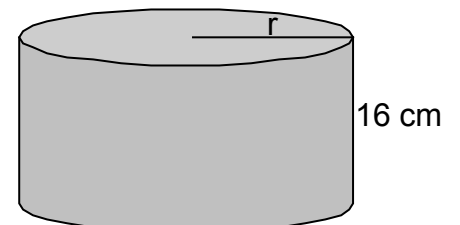
16 cm

10 cm

50 cm

(b) The cylinder opposite has the same volume as the cuboid in (a).
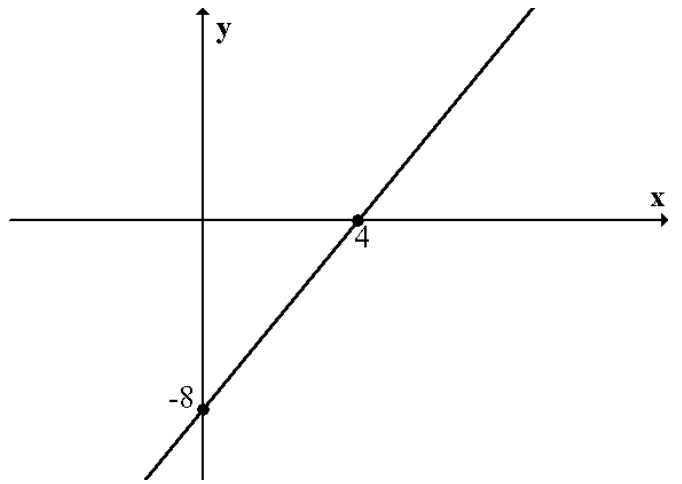Find the radius, r, of the cylinder.

r

17 cm

9. (a) The prism opposite has a cross-section in the form of a rectangle and a triangle.
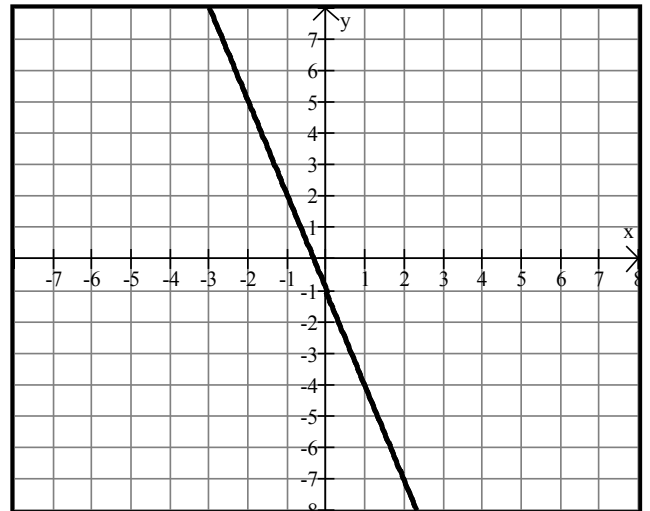Calculate the volume of this prism.

25 cm

30 cm

14 cm

24 cm

(b) The cylinder opposite has the same volume as this prism.
Find the radius of the cylinder.

r

16 cm

10. Find the equation of the line opposite.

11. Find the equation of the line opposite.

12. Write down the gradient and y intercept of each line below

   (a) $y = 4x - 3$ (b) $y = -4x$ (c) $3y = 9x + 1$ (d) $2y - 3x = 4$ (e) $4x - 2y - 8 = 0$

13. Expand the brackets and simplify

   (a) $2(x - 2y) - 3(2x - 3y)$ (b) $(2a - 3)(2a + 3)$ (c) $(6x - 3)^2$

   (d) $(3p - 4)(p^2 - 2p - 1)$ (e) $(3x - 2y)^2 + 12xy$ (f) $6n^2 - (2n + 3)(2n - 4)$

14. Factorise

   (a) $x^2 - 6x$ (b) $2p + 6p^2$ (c) $u^2 - 100$ (d) $3m^2 - 12$

   (e) $4x^2 - 49y^2$ (f) $a^2 - 11a + 30$ (g) $p^2 - 7p - 18$ (h) $12 - h - h^2$

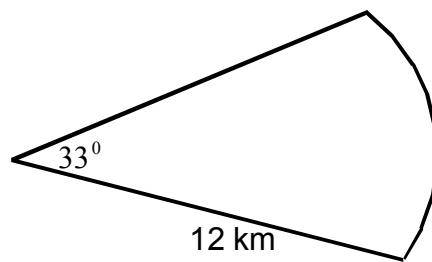   (i) $2g^2 + g - 15$ (j) $5y^2 - 16y + 3$ (k) $6y^2 - y - 2$

15. (a) Factorise fully $2m^2 - 10m$

   (b) Hence simplify $\dfrac{2m^2 - 10m}{2m^2 - 50}$

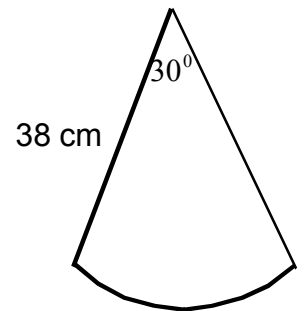16. (a) Factorise $2x^2 - 5x - 12$

   (b) Hence simplify $\dfrac{2x^2 - 5x - 12}{x^2 - 3x - 4}$

17. The beam from a lighthouse reaches a distance of 12 kilometres and spreads
     to an angle of 33°.

33^0

12 km

   Calculate the area covered by the beam from the lighthouse.

18. The pendulum of a clock is 38 cm long.
     It swings through an angle of 30º.
     Calculate the length the pendulum
     travels in one swing.

30^0

38 cm
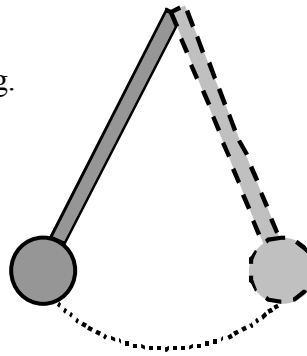
19. The diagram shows a fan in the shape of an arc
     of a circle with radius 35 cm.
     The area of the fan is 1710 cm^2.
     Calculate the size of the angle at A.

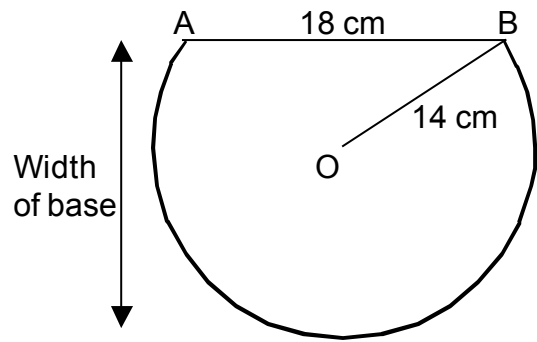20. The base of a lamp is in the shape of part of a circle with a straight edge, as shown.

The centre of the circle is O.
AB is a chord of the circle.
AB is 18 centimetres.
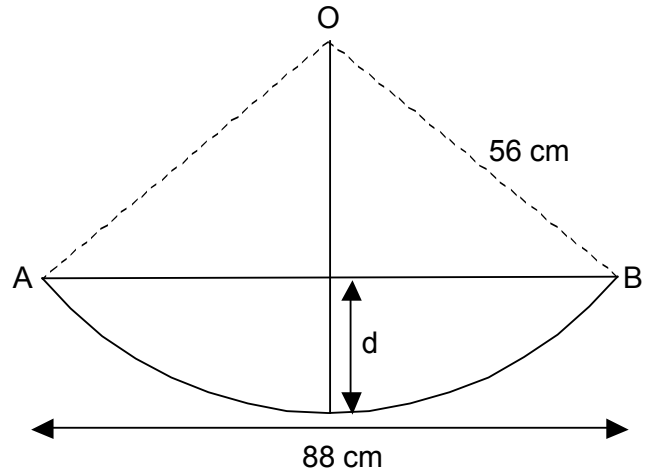The radius, OB, of the circle is 14 centimetres.

Calculate the width of the base.

A   18 cm   B

14 cm

O

Width of base

21. The diagram shows a drainage ditch at the side of a road.
The ditch is in the shape of an arc of a circle centre O.

The radius of the circle is 56 centimetres.
The distance AB is 88 centimetres.

Calculate the depth of the ditch, d.

O

56 cm
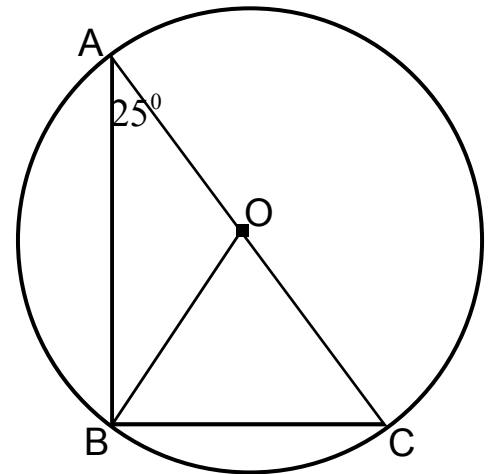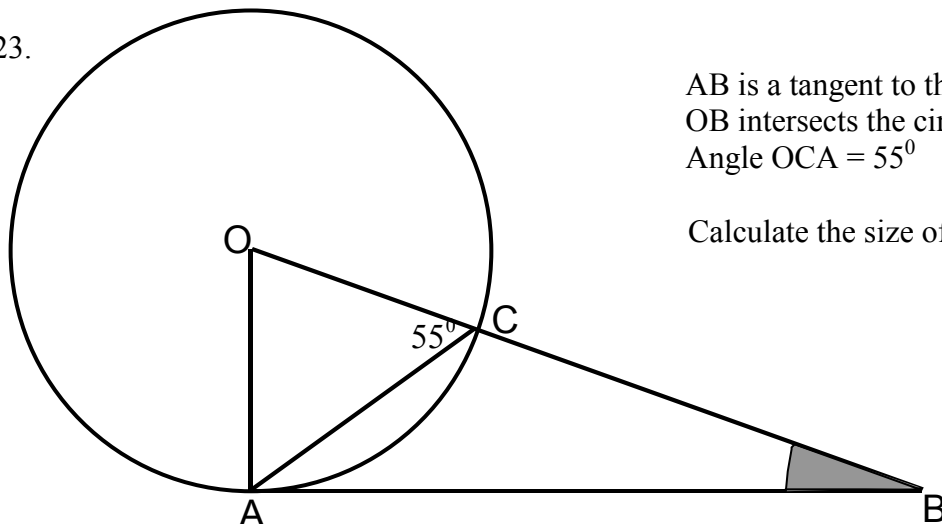
A   B

d

88 cm

22. In the diagram

- O is the centre of the circle
- AC is a diameter
- B is a point on the circumference
- Angle BAC $= 25^0$.

Calculate the size of angle BOC.

A

25^0

O

B   C

23.

O

55^0 C

A   B

AB is a tangent to the circle at A
OB intersects the circle at C
Angle OCA $= 55^0$

Calculate the size of angle OBA

Intermediate 2 – Revision
Unit 2

1. The diagram above shows triangle ABC with measurements as shown.

   Show that $\cos x° = \frac{1}{5}$.

5 cm

7 cm

6 cm

A

B

C
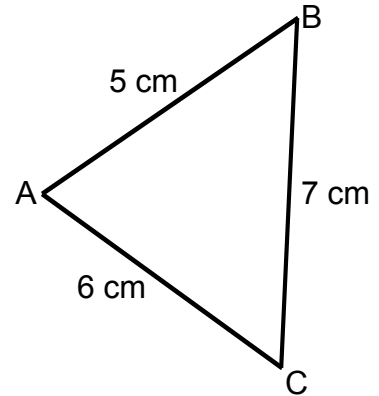
2. The diagram opposite shows a triangle PQR. Given that $\cos 60^0 = \frac{1}{2}$, find the length of PR.

P

5 cm

Q 60^0

8 cm

R
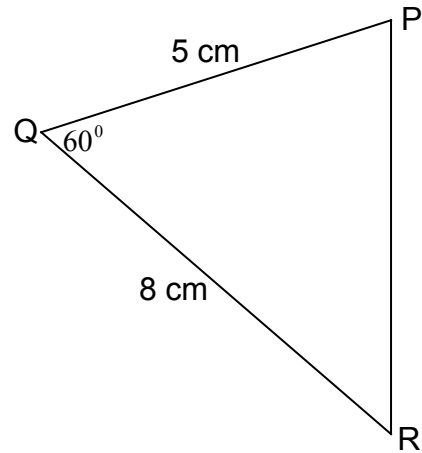
3. Calculate x in each of the following.

(a)

P

13 cm

11.5 cm

Q x^0

9 cm

R

(b)

A 53^0

B

x

8.6 cm

70^0

C

(c)

K

80 mm

L 96^0

x

85 mm

M
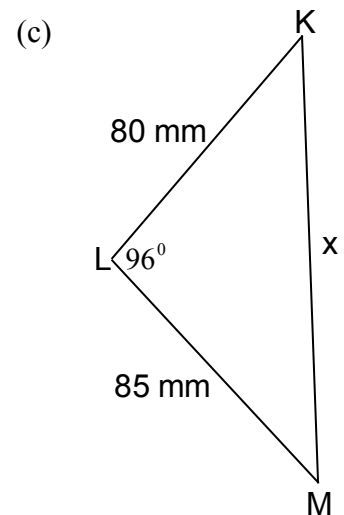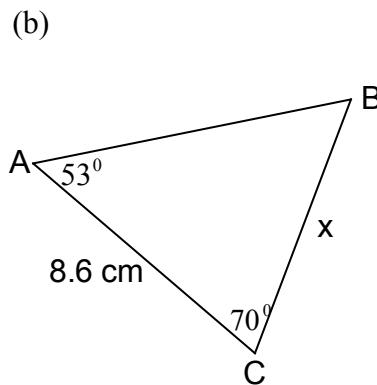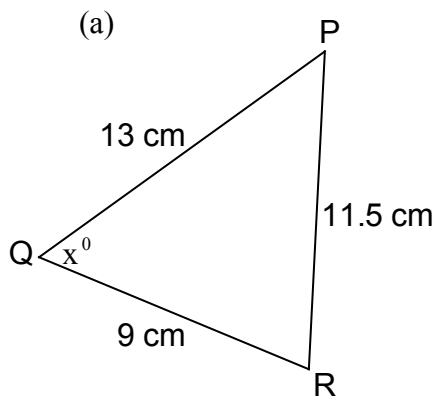
4. Calculate the area of the triangle below.

E

117^0

11.8 cm

14 cm

F

G
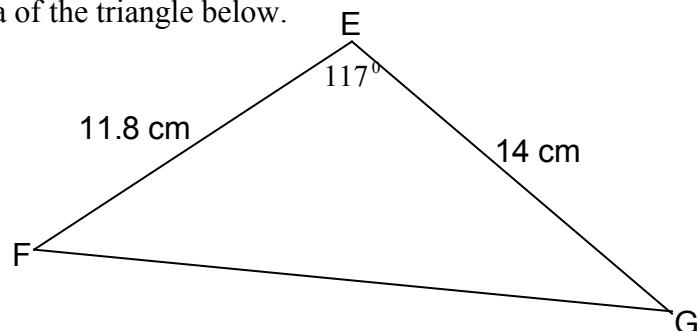
5. The diagram shows the position of an airport and two aeroplanes flying at the same height..
Calculate the distance between the aeroplanes.

2200 m

3000 m

15^0
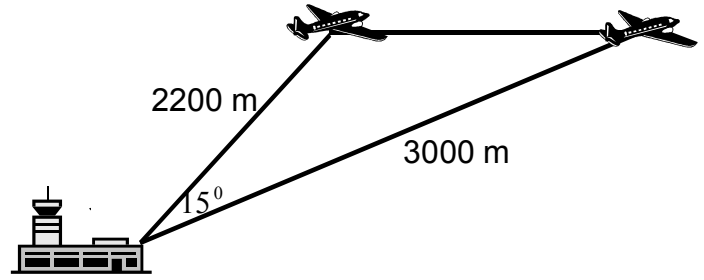
6. The diagram below shows a block of flats next to a factory with a chimney.

74^0

54 m

h

52^0
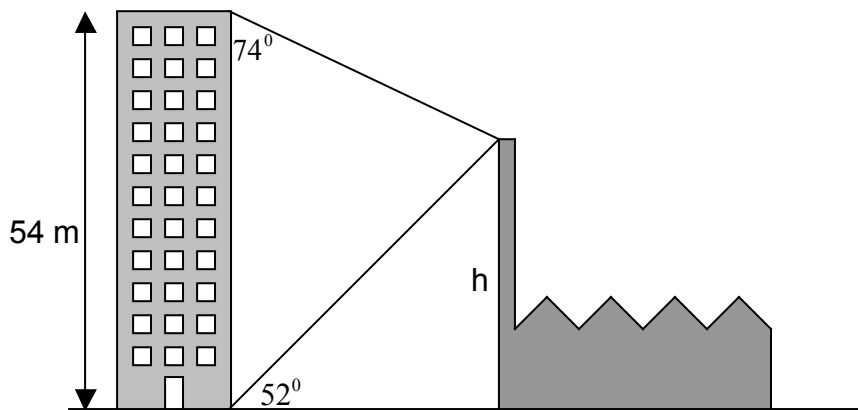
The block of flats is 54 metres high.
From the bottom of the flats the angle of elevation to the top of the chimney is 52^0. From the roof of the flats the angle to the top of the chimney is 74^0.

Calculate h, the height of the chimney from the ground.

7. Bill and Ted leave checkpoint A on a cross-country trek.
Bill walks on a bearing of 055° at a speed of 4kmph.
Ted walks on a bearing of 115^0 at a speed of 3.5kmph.
After 3 hours Bill stops walking but Ted walks for 4 hours before stopping.
How far apart are Bill and Ted after 4 hours?

N

Bill

A

Ted
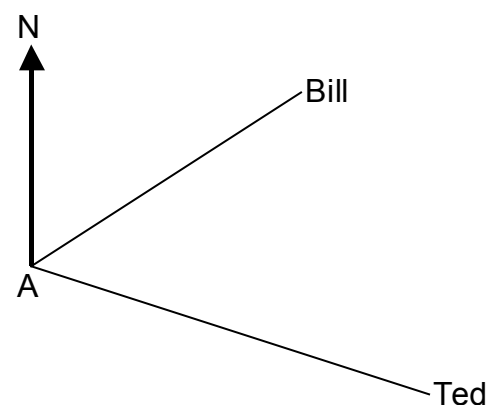
8. The diagram opposite shows a prism with a cross-section in the shape of a regular hexagon.

Calculate the volume of this prism.

18 cm

20 cm
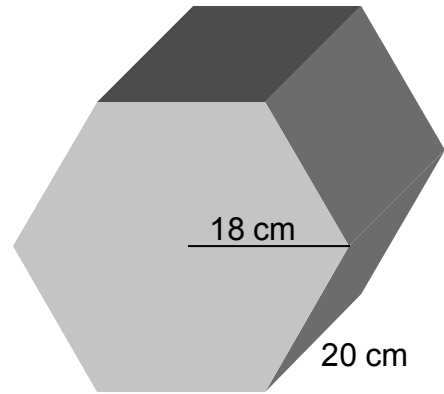
9. Solve the simultaneous equations

(a) $2x + 3y = 14$
$3x - y = 10$

(b) $3m + 2n = 9$
$5m + 3n = 16$

10. The diagram opposite shows the lines

$3x - y = 2$ and $2x + 3y = 16$

Find the coordinates of A, the point of intersection of these lines.

$3x - y = 2$

A

$2x + 3y = 16$
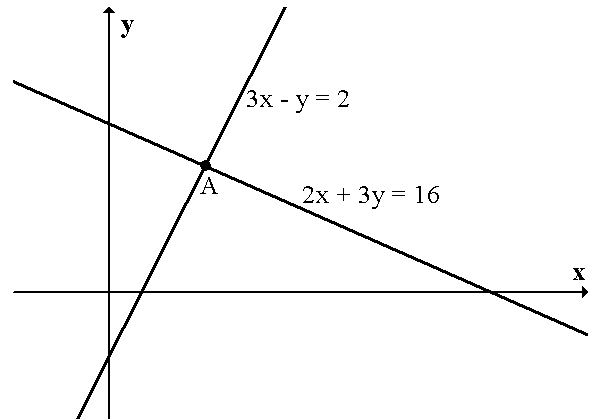
11. A group of lecturers and university students are going to study an old ruined castle. To get to the castle they travel by train. The train tickets for the lecturers cost £12 but the students get a discount and pay £7. The total cost of the tickets is £132.

(a) Write down an equation to represent this information.

There are a total of 16 people in the group.

(b) Write down an equation to represent this.

(c) How many lecturers and how many students are in the group?

12. 6 pens and 4 pencils cost £1.08.
    4 pens and 3 pencils cost 75 pence.

    Find the cost of 5 pens and 5 pencils.

13. The distances, in yards, 12 different golfers hit the ball with
    their driver is recorded. The results are shown below.

    255   234   222   249   250   247
    234   235   221   245   248   263

    (a) Show this information in a stem and leaf diagram.
    (b) Find the median distance the ball was hit.
    (c) Write down the range of these distances.
    (d) What is the probability the ball was hit over 250 yards?
    (e) What is the modal distance the ball was hit?

14. The stem and leaf diagram below shows the number of pupils in 20
    different classes in a secondary school.

    ```
    0 | 8 9
    1 | 3 3 4 6 7
    2 | 0 1 5 5 5 6 8 9 9
    3 | 0 0 1 2
    ```
                                    n = 20   3 | 2 represents 32

    (a) Find the median and lower and upper quartiles of this data.
    (b) Draw a boxplot to illustrate the data.
    (c) Calculate the semi-interquartile range of the data.
    (d) What is the probability a class contained more than 25 pupils?

15. The average monthly temperature in a holiday resort was recorded.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature (^{0}C)	9	14	16	19	23	26	28	28	24	17	14	7

Draw a suitable statistical diagram to illustrate the median and quartiles of this data.

16. The costs of a microwave oven in 7 different shops are given below.

£45   £50   £42   £44   £42   £45   £47

   (a) Calculate the mean and standard deviation of these costs.

   (b) Each shop cuts its prices by £8. Write down the mean and standard
   deviation of the costs now.

17. (a) The prices of a bag of sugar in 6 different shops are

    86p   88p   84p   79p   81p   86p

   Calculate the mean and standard deviation of these prices.

   (b) In 6 different shops the same bag of sugar has a mean price of 87 pence and
       a standard deviation of 5.2 pence.
       Make two comparisons between the prices in the two sets of shops.

18. Globesun is a travel company. Last year's income
    from holidays to France, Spain, Italy and the USA
    are shown in the pie chart opposite. Income from
    these holidays totalled £12 000 000.
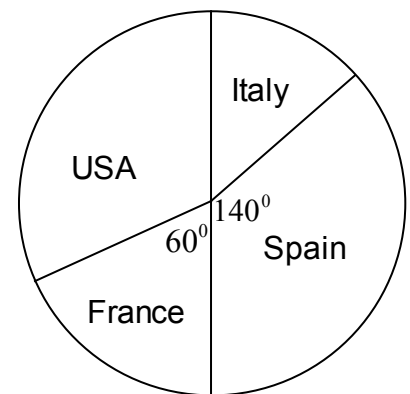
   (a) How much income did they get from holidays
       to France?

   (b) How much did they get from holidays to Spain?

19. Last year 180 4th year pupils at Hollyside
    Academy sat national exams in Maths.
    The results are shown opposite.
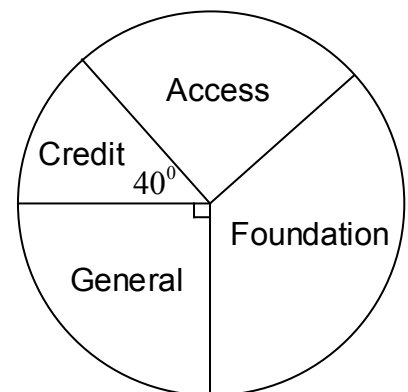
   (a) How many pupils sat Credit Maths?

   (b) How many pupils sat general Maths?


20. In a local election there were 2160 votes
    cast. The votes gained by each party are
    given in the table opposite.
    Show this information in a pie chart.

Party	Votes
Labour	624
Conservative	318
Lib. Dem.	330
SNP	660
Other	228

21. The scattergraph below shows the Maths and Physics marks of a group of pupils in a third year examination. A line of best fit has been drawn on the diagram. The points (0,10) and (60,60) both lie on this line.

Marks in Exams
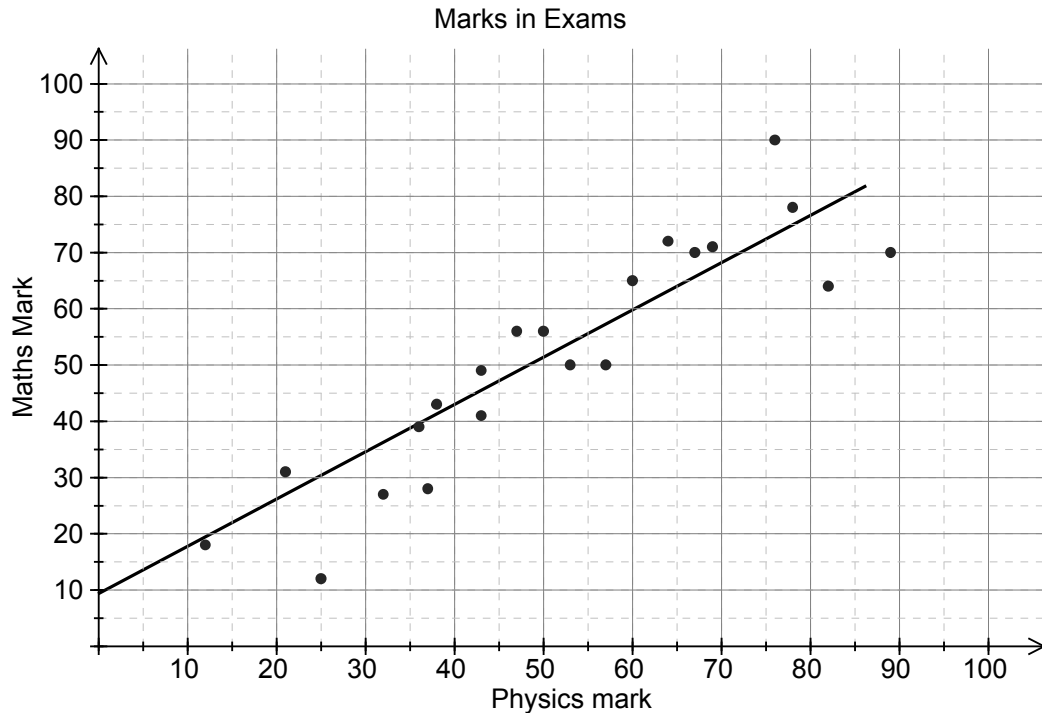
(a) Describe the relation between the Physics and Maths marks.
(b) Find the equation of this line of best fit.
(c) Use your equation to estimate the Maths mark for a pupil who scored 72 in Physics.

22. The marks of a group of students in a class test (C) and in the final exam (F) are shown in the scattergraph below.
A line of best fit has been drawn.
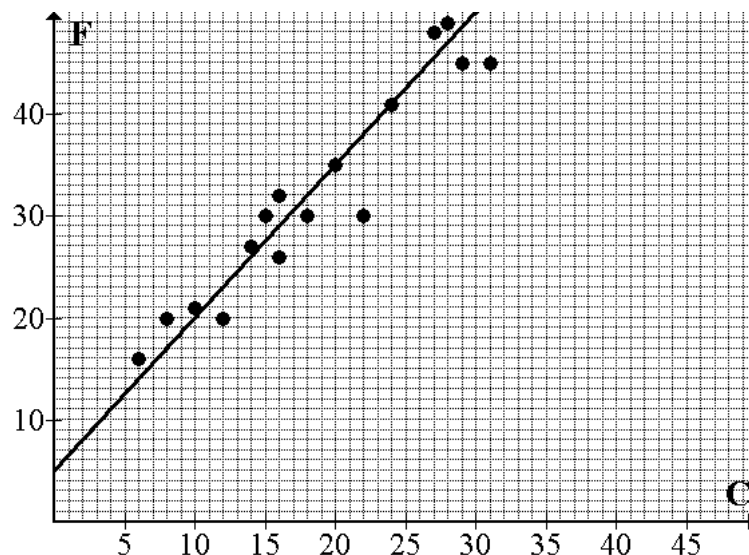
David scored 20 in the class test and 35 in the final exam.
(a) Find the equation of the line of best fit.
(b) Use your answer to part (a) to predict the final exam mark for a student who scored a mark of 26 in the class test.

23. The table shows the way in which 180 pupils travel to school.

	Boys	Girls
Car	15	18
Bus	30	10
Train	5	8
Walk	50	44

   If a pupil is chosen at random in the school what is the probability that
   (a) The pupil is a boy?
   (b) The pupil is a girl who travels to school by car?
   (c) The pupil is a boy who walks to school?

24. A die is thrown 40 times. The results are shown below.

Throw	Frequency	Throw x Frequency
1	7	
2	6	
3	5	
4	8	
5	6	
6	8	

   (a) Calculate the mean throw.
   (b) Show the distribution of the throws in a bar chart.

25. The weights, in kilograms, of 6 new born puppies are

       2.2   3.1   2.5   3.6   3.6   1.8

   (a) Calculate the mean weight of the puppies.
   (b) Another puppy is born. The mean weight of the 7 puppies
        is now 2.9 kilograms. Find the weight of the 7th puppy.

26. The colour of football strip worn by 40 different teams was recorded as follows

Colour	Frequency
Blue	6
Green	2
White	6
Red	7
Yellow	3
Other	16

   (a) Construct a column of cumulative frequencies for this table.
   (b) Construct a column of relative frequencies
   (c) If the information was to be illustrated in a pie chart, calculate the size of angle
       which would represent
        (i) a blue strip   (ii) a white strip.