National 5 Lifeskills Past Paper Questions

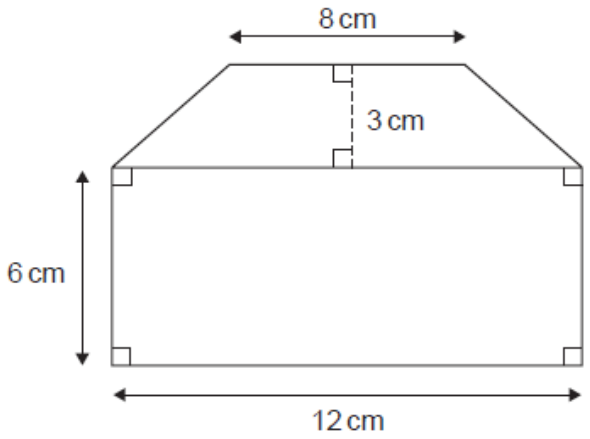
Geometry and Measures

Section 1: Geometry

Investigating a situation involving gradient.

Solving a problem involving a composite shape which includes part of a circle.

The shape is a drawing of a dolls house.



Not drawn accurately

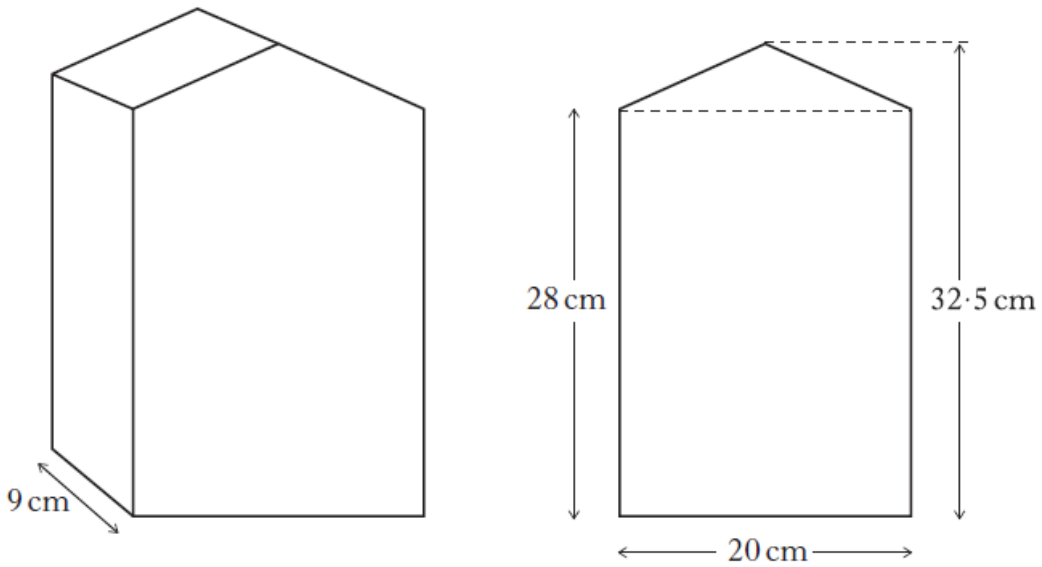
Work out the area of this shape.
State the units of your answer.

Solving a problem involving the volume of a composite solid.

A container for oil is in the shape of a prism.

The width of the container is 9 centimetres.

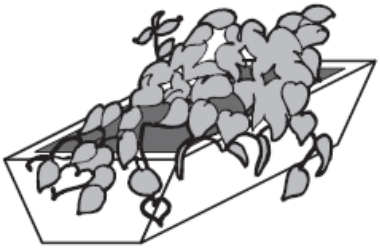
The uniform cross section of the container consists of a rectangle and a triangle with dimensions as shown.

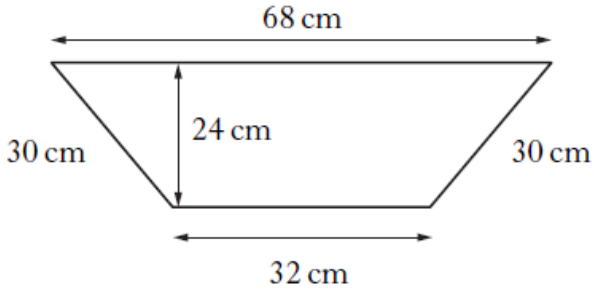


Calculate the volume of the container, **correct to the nearest litre.**

A flower planter is in the shape of a prism.

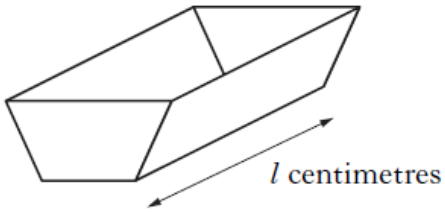
The cross-section is a trapezium with dimensions as shown.





(*a*) Calculate the area of the cross-section of the planter.

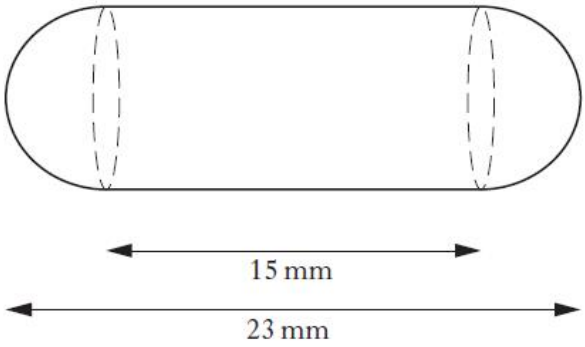
(*b*) The volume of the planter is 156 litres.



Calculate the length, *l* centimetres, of the planter.

A health food shop produces cod liver oil capsules for its customers.

Each capsule is in the shape of a cylinder with hemispherical ends as shown in the diagram below.



The total length of the capsule is 23 millimetres and the length of the cylinder is 15 millimetres.

Calculate the volume of one cod liver oil capsule.

A lead **cube**, of side 10 centimetres, is melted down.

During this process 8% of the metal is lost.

The remaining metal is then made into a **cone**, with radius 8 centimetres.

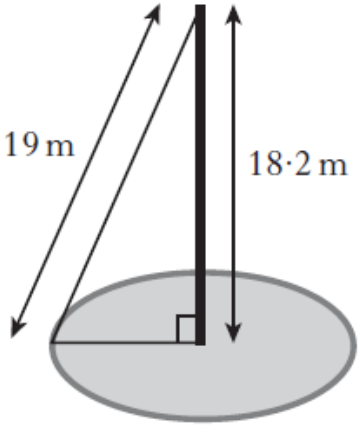
Calculate the height of this cone.

Give your answer correct to 2 significant figures.

Using Pythagoras' theorem within a two-stage calculation.

A mobile phone mast, 18·2 metres high, stands vertically in the centre of a circle.

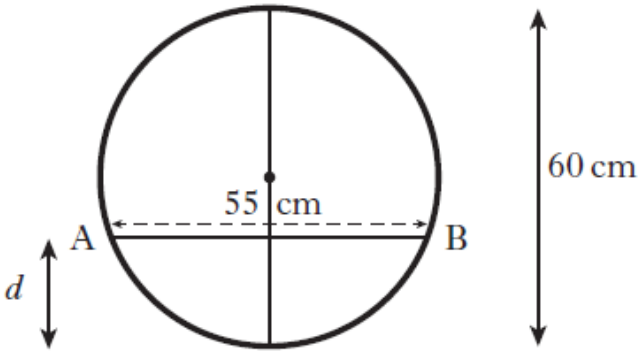
It is supported by a wire rope, 19 metres long, attached to the ground at a point on the circumference of the circle, as shown.



Calculate the circumference of the circle.

Water flows through a horizontal pipe of diameter 60 centimetres.

The surface width, AB, of the water is 55 centimetres.



(*a*) Calculate the depth, *d*, of the water in the pipe.

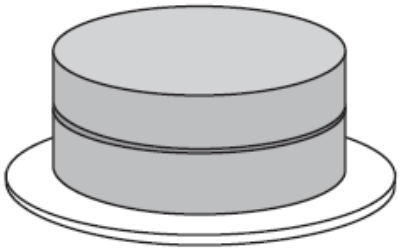
(*b*) What other depth of water would give the same surface width?

Section 2: Measurement

Calculating a quantity based on two related pieces of information.

Jamie is going to bake cakes for a party.

He needs $\frac{2}{5}$ of a block of butter for 1 cake.



He has 7 blocks of butter.

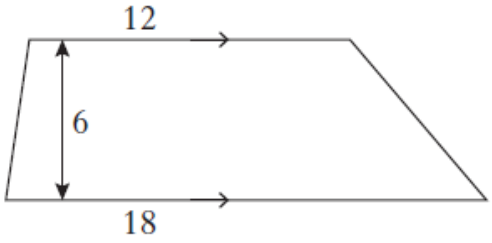
How many cakes can Jamie bake?

The area of a trapezium is calculated by

$$A = \frac{1}{2}(a+b)h$$

where a and b are the parallel sides and h is the vertical distance between them.

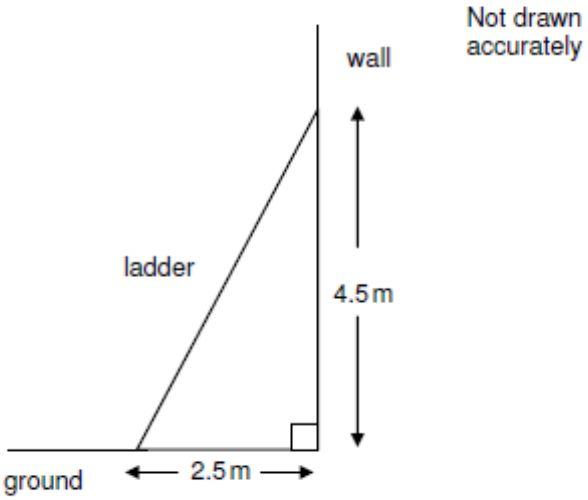
Calculate the area of the trapezium below.



Constructing a scale drawing, including choosing a scale.

Sophie has put a ladder against a vertical wall.

The wall is at right angles to the ground.



(a) Make a scale drawing of this diagram.

The ground has been drawn for you.

Use a scale of 2 cm to represent 1 metre.

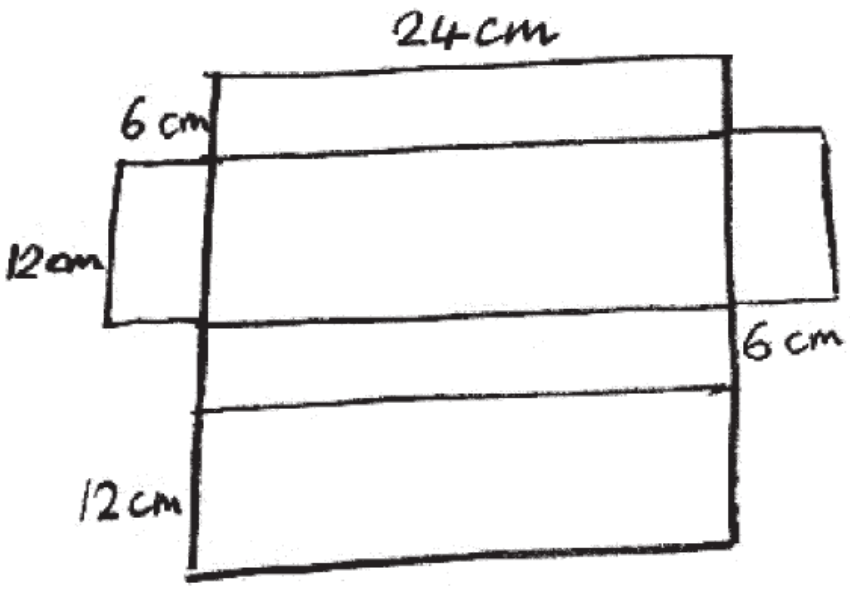
(b) For the ladder to be safe to use, the angle between the ladder and the ground must be between 70° and 75°

Is the ladder safe for Sophie to use?
Give a reason for your answer.

Debbie designs a box for biscuits sold at a supermarket.
She needs to draw an accurate net of the box.

The box is a cuboid 6 cm by 12 cm by 24 cm

Here is Debbie's rough sketch of the net of the box.



Debbie has to use a scale of 1:6

(a) Draw an accurate net of the box for Debbie.

(3)

Debbie needs to plan how to display the boxes on a supermarket shelf.

The shelf space is 75 cm by 28 cm by 56 cm.
The biscuit boxes are 6 cm by 12 cm by 24 cm.

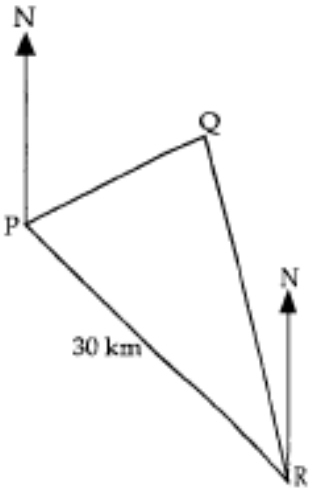
Debbie thinks she can fit at least 48 biscuit boxes in the shelf space.

(b) Is Debbie correct?

(3)

A ship, at position P, observes a lighthouse at position Q on a bearing of 040°.
The ship travels 30 kilometres on a bearing of 125° to position R.
From position R, the ship observes the lighthouse on a bearing of 340°.

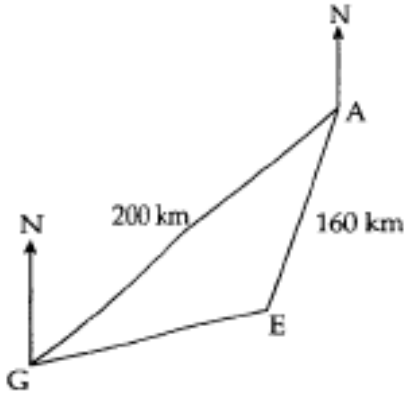
When the ship is at position R, how far is it from the lighthouse?



The diagram shows the positions of three airports, A, E and G.

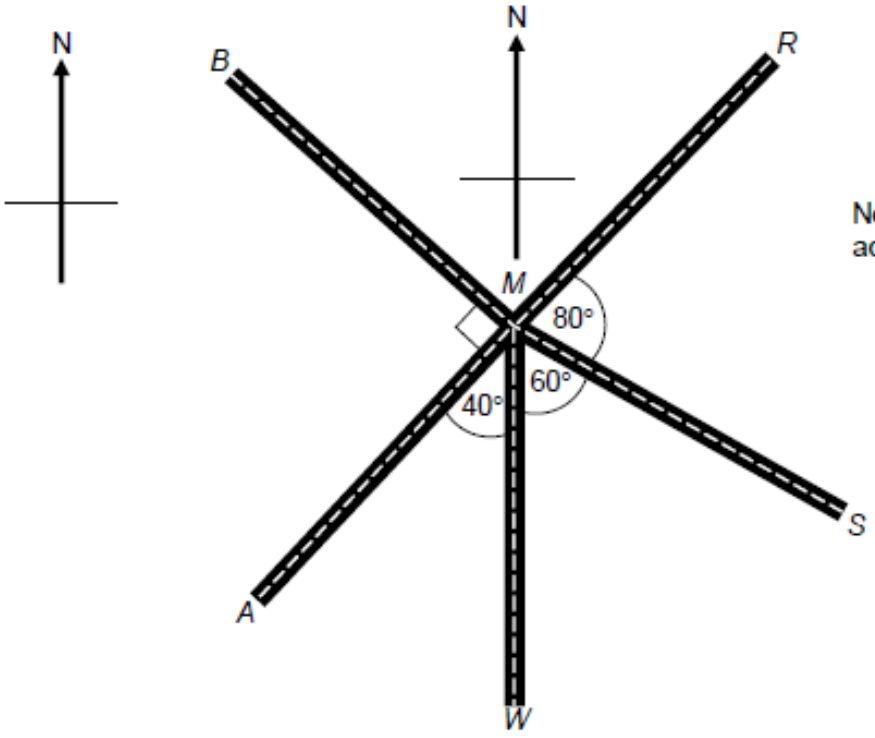
- G is 200 kilometres from A.
- E is 160 kilometres from A.
- From G the bearing of A is 052°.
- From A the bearing of E is 216°.

How far apart are airports G and E?



Planning a navigation course.

Five roads meet at *M*.
W is due South of *M*.



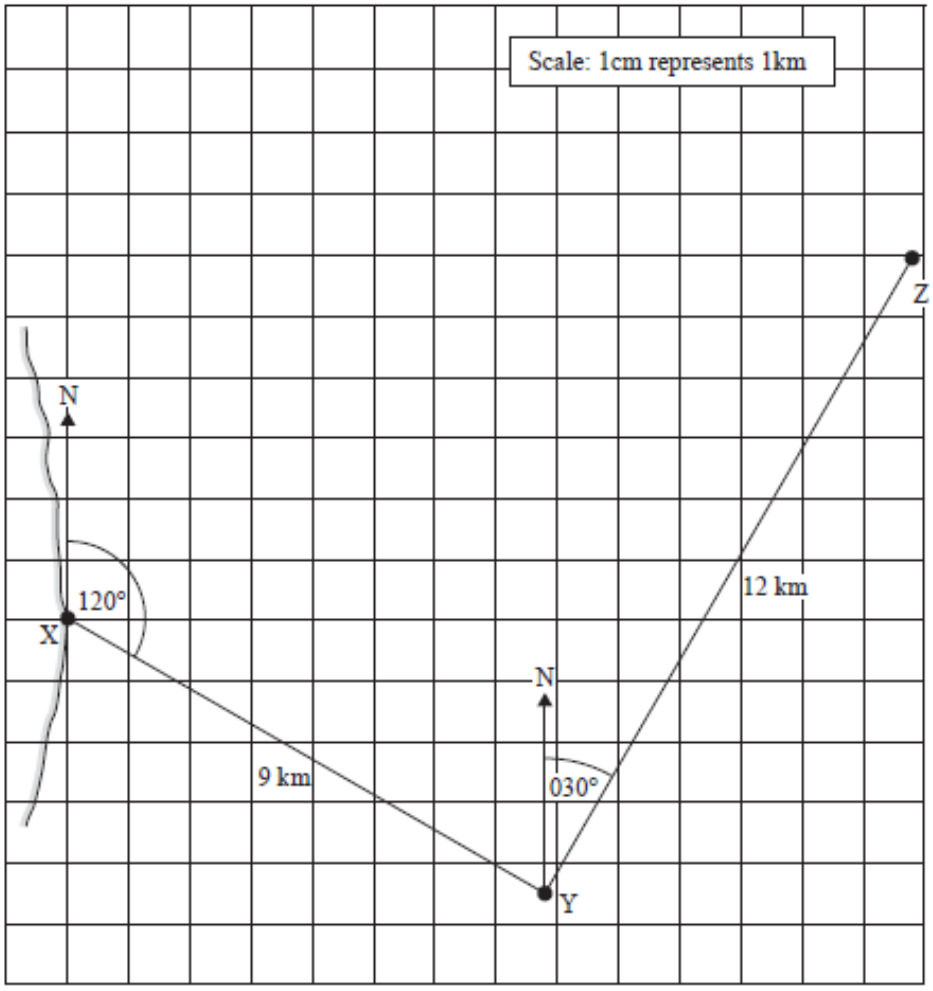
Not drawn accurately

(a) Is *AMR* a straight line?

(b)(i) What is the bearing of R from *M*?

(b)(ii) What is the bearing of *M* from *R*.

A ship leaves port X and travels 9 km on a bearing of 120° to point Y.
The ship then turns and travels 12 km on a bearing of 030° to point Z.
This journey is shown on the scale drawing below.



The ship then turns and travels directly back from Z to X.

Use a ruler and protractor to work out the distance and bearing of the journey from Z to X

Distance ..... km

Bearing..... °

[Use an appropriate Scale]

A ship travels 44 km from the point P on a bearing of 042° and then travels a further 60 km on a bearing of 090° to arrive at point A.

(a) draw accurately the path of the ship from P to A in the space above.
Label the point A.

A second port Q is on a bearing 080° from port P and on a bearing of 110° from point A.

(b) On the same diagram, locate the position of Q. Label the port Q.

(c) Write down the distance, in km, of port Q from port P.

Carrying out efficient container packing.

29 52 73 87 74 47 38 61 41

The numbers in the list represent the lengths in minutes of nine radio programmes. They are to be recorded onto tapes which each store up to 100 minutes of programmes.

(b) Use the first-fit bin packing algorithm to fit the programmes onto the tapes.

(c) Use the first-fit decreasing bin packing algorithm to fit the programmes onto the tapes.

41 28 42 31 36 32 29

The numbers in the list represent the weights, in kilograms, of seven statues. They are to be transported in crates that will each hold a maximum weight of 60 kilograms.

(b) Use the first-fit bin packing algorithm to allocate the statues to the crates.

(c) Use the full bin algorithm to allocate the statues to the crates.

(d) Explain why it is not possible to transport the statues using fewer crates than the number needed for part (c).

James is going to cover his dining room floor with laminate flooring.
The dining room floor is 3.6 m by 4.8 m.

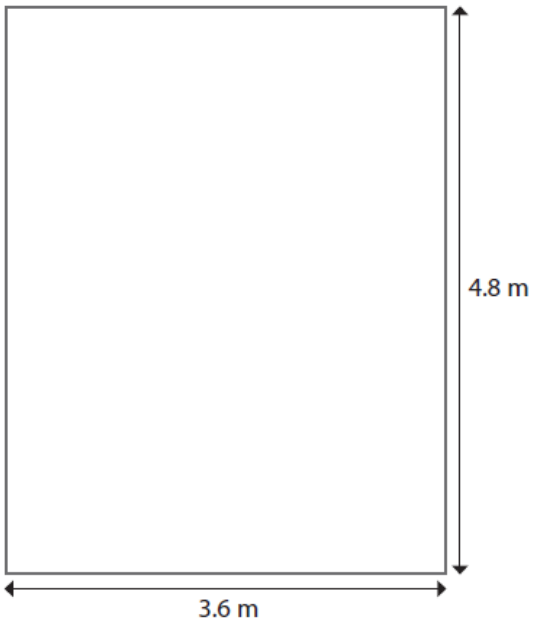
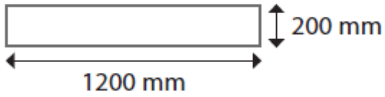


Diagram **NOT** accurately drawn

The laminate flooring is sold in packs.

Each pack has 8 pieces of laminate.
Each piece is 1200 mm by 200 mm.

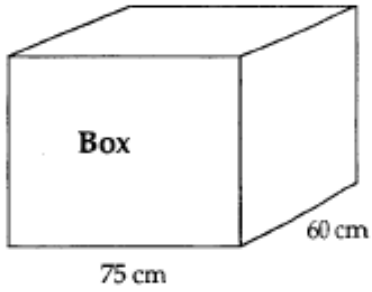


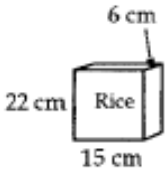
James buys 10 packs.

Does James have enough laminate flooring to cover the dining room floor?

(5)

A large box is filled with packets of rice.
Each packet measures 15 centimetres by 6 centimetres by 22 centimetres and the packets are stacked upright in the box.





(*a*) How many packets fit exactly into the base of the box?

(*b*) When full, the box contains 150 packets.
What is the height of the box?

(*c*) How many boxes could be stacked on top of each other in a space which is 5 metres high?
Show all your working.

Using precedence tables to plan tasks.

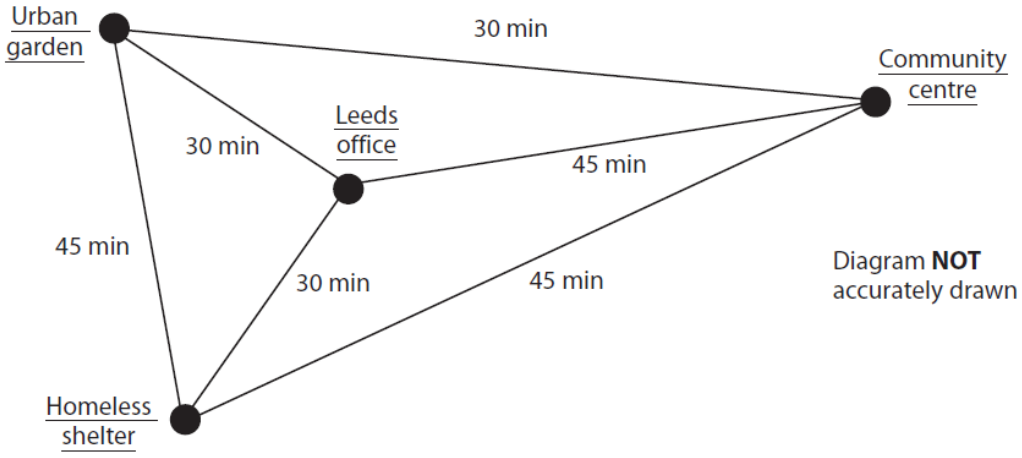
Solving a problem involving time management.

Fiona works for a charity.
Her office is in Leeds.
She makes notes about what she has to do on Monday.

Start at 9 am at Leeds office
Finish by 6 pm
Lunch – 30 to 45 minutes - between twelve noon and 2 pm

Community centre – meeting at 2 pm – 1 hour
Work in Leeds office - $1\frac{1}{2}$ hours
Urban garden – tour & talk - 2 hours
Homeless shelter - review finances - $1\frac{1}{2}$ hours

The diagram below shows the travelling times in minutes between these places.



Fiona needs a time plan to fit in all of Monday's work.
It must show the start time and the finish time at each place.
It must also show the time for her lunch break and the time she will finish work.

Make a time plan for Fiona.
Remember to check your time plan. (5)

Dave is a milk tanker driver.
He collects milk from farms.

At 9:35 am he arrives at Pete's farm.

Dave has to wait until the temperature of the milk is 5°C or below.
The temperature of Pete's milk is 9°C at 9:35 am.
The milk cools at a rate of 1°C every 10 minutes.

Then Dave pumps the milk into the tanker at 20 000 litres per hour.
Dave has to collect 2500 litres of milk from Pete's farm.

Dave usually takes an extra 5 to 10 minutes to pack up at the end.

He wants to leave Pete's farm by 10:45 am.

Will Dave be ready to leave Pete's farm at 10:45 am?
Show how you have checked your answer. **(6)**

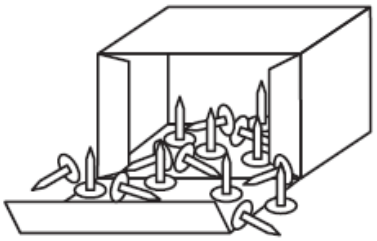
New York time is 5 hours behind British time.
When it is 7pm in Britain, it is 2pm in New York.

(*a*) At 10am Gordon, who is in New York, phones home to Britain.
What time is it in Britain?

(*b*) Los Angeles time is 3 hours behind New York time.
From Los Angeles, Fiona needs to phone a colleague in Aberdeen before 6pm, British time.
She makes the phone call at 9.30am, Los Angeles time.
Does she meet the 6pm deadline?
Give a reason for your answer.

Considering the effects of tolerance

A sample of six boxes contains the following numbers of pins per box.



43 39 41 40 39 44

(*a*) For the above data, calculate:

(i) the mean;

(ii) the standard deviation.

The company which produces the pins claims that "the mean number of pins per box is 40 ± 2 and the standard deviation is less than 3".

(*b*) Does the data in part (*a*) support the claim made by the company?

Give reasons for your answer.

A sculpture is to be made by stacking three blocks of stone.
Each block of stone is a cube of side (1.2 ± 0.05) metres.

What is the maximum height of the sculpture?