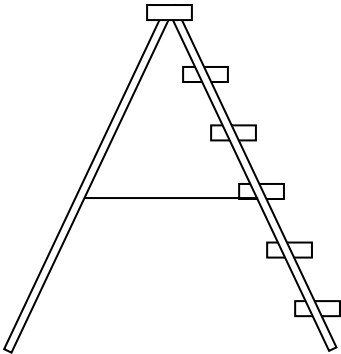


Year 11 Foundations of Maths – Practice Exam 2

Question 1 (3 marks)

A step ladder stands 2.5m high unopened and 2.1m high when opened. How far apart are the feet of the ladder when it is opened?



Question 2 (3 marks)

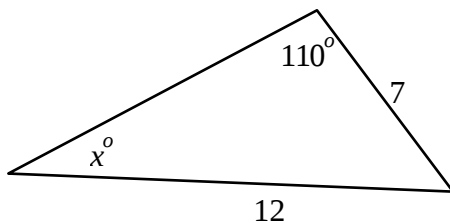
Sort the following data into an appropriate stem and leaf diagram

139, 168, 142, 133, 152, 155, 131, 140, 163, 155,
143, 151, 127, 173, 168, 170, 142, 159, 155, 147

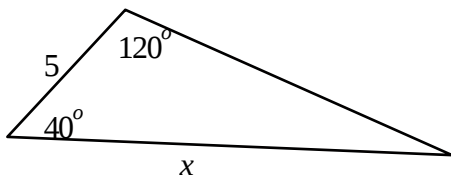
Question 3 (2,2 marks)

Find the value of the variable in each triangle below. (Give answers correct to 1 decimal place. All lengths are in metres.)

a)



b)



Question 4 (3 marks)

When the sun is at an elevation of 48° , a flagpole casts a shadow 5.5m long. What is the height of the flagpole to the nearest centimetre?

Question 5 (1,1,1,2,1 mark)

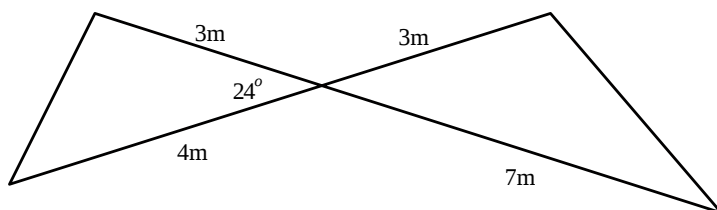
A real estate survey investigating the number of bedrooms in each of 100 houses in the Midland and Hills Area, recorded the following results.

Number of Bedrooms	1	2	3	4	5	6	7
Frequency	2	3	37	49	5	3	1

- a) Find the mean number of bedrooms per house
- b) Find the median number of bedrooms
- c) Find the modal number of bedrooms
- d) Find the Interquartile range of the number of bedrooms per house
- e) Find the standard deviation of the number of bedrooms per house

Question 6 (5 marks)

Find the area enclosed by the figure below to the nearest cm^2 .



Question 7 (4,5 marks)

Two scouts left their base camp, O, at the same time. The first scout walked at a constant speed of 7 km/h on a bearing of 130° and the second scout walked at 8 km/h on a course of 240° .

(a) Draw a sketch for this situation and determine how far apart the scouts were after 3 hours.

(b) After 3 hours the second scout cannot go on and requests help via the radio. Find the bearing (to the nearest degree), the first scout would take to reach the person requiring help.

Question 8 (6 marks)

An isosceles triangle ABC has an area of 12m^2 . Determine all the possible values of the angle included by the congruent sides of 6 cm. Draw sketches.

Question 9 (3,3,3,3,3 marks)

At an airport, a flight controller is in a tower 45m above the ground. She observes an aeroplane flying at a constant altitude at an angle of 14° from her line of sight. Seven seconds later, the plane flies directly overhead.

(a) Draw a diagram representing the time when the flight controller first sighted the plane. Include all measurements and angles where possible.

(b) If the plane has a constant speed of 370 km/h, what distance, in metres, did it cover between the time the flight controller first observed the plane to when it passed overhead?

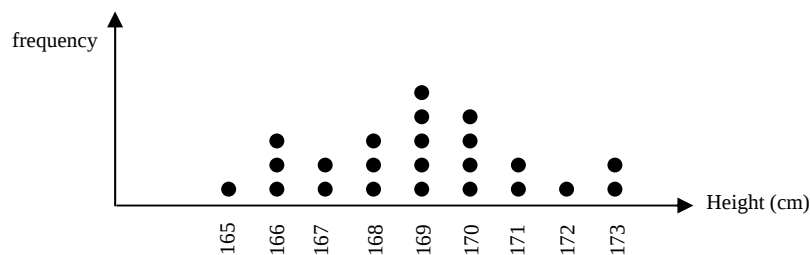
(c) Calculate the plane's height above the ground, in metres.

(d) After reaching the tower, the aeroplane climbed for the next 12 seconds without changing speed to reach a new altitude of 1000m. What would its new angle of elevation be?

(e) How far has the plane travelled horizontally since it was first sighted?

Question 10 (3,3 marks)

The diagram below shows the dot frequency graph for the heights of 23 students.



a) Calculate the median and the upper and lower quartiles.

b) Draw a boxplot to represent this data

Question 11 (2,2 marks)

If the mean percentage water content of wheat shipments is greater than 6%, the load will not be accepted by the Australian Wheat Board for storage. A farmer who is ready to harvest his crops takes samples and receives the following percentage readings.

3, 8, 4, 6, 2, 5, 7, 9, 4, 2, 1, 3

a) Calculate the mean and standard deviation for this set of scores

b) Based on this information, will the wheat board accept shipment of the farmers crops? Give a reason for your answer

Question 12 (1,2,2,2,2 marks)

Given the points A(2,2) , B(12, 2) , C(15, 15) and D(5,15)

a) Find the gradient of the line AC

b) Find the equation of the line AC

c) How far is it from B to D?

d) Find the coordinates of the point midway between A and C

e) Find the point of intersection of AC and BD. Justify your answer

Question 13 (1,4,3 marks)

The formula $d = 0.7v + 0.012v^2$ is used to calculate the breaking distance in meters d of a vehicle travelling at v km/h.

a) Calculate the distance necessary to stop a vehicle travelling on the freeway at 90 km/h

b) Calculate the speed of a car that could stop in exactly 250m

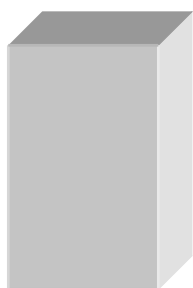
c) Given the new speeding laws which come into effect on December 1st which lower the suburban speed limit from 60km/h to 50km/h, calculate the estimated reduction in stopping distance to the nearest cm.

Question 14 (7 marks)

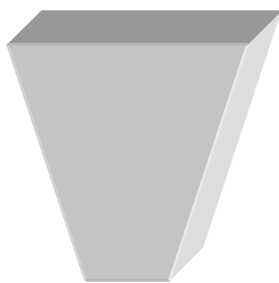
For the function $y = a(x + p)^2 + q$, draw sketches and write clear explanations on the effect of changing the values of a , p , and q .

Question 15 (4,2 marks)

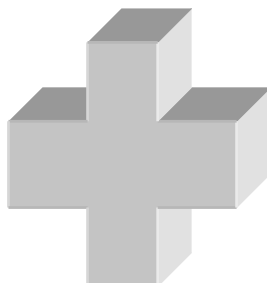
A cold water tap is allowed to run at a constant rate, filling each of the containers below.



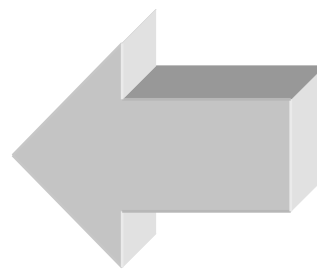
Container A



Container B

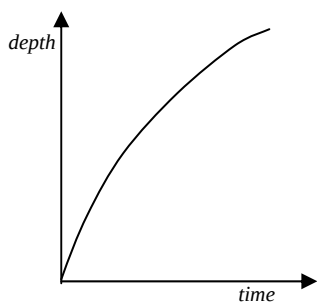


Container C

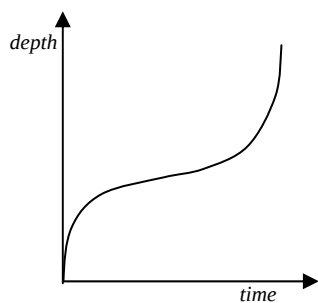


Container D

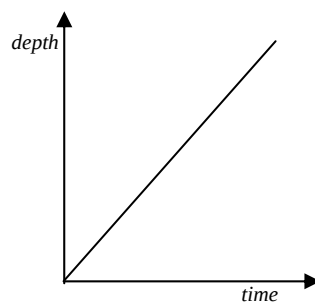
a) The following graphs shows how the depth of the water increases during the filling process with respect to time. Match the graph with the container it is representing



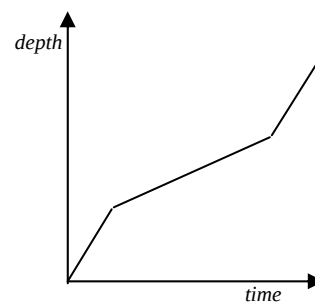
Container _____



Container _____

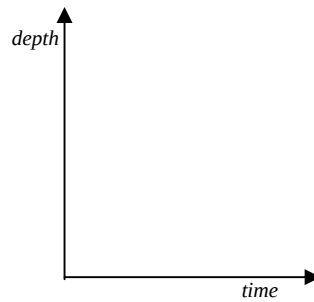
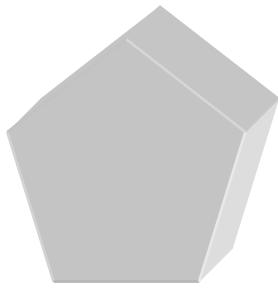


Container _____



Container _____

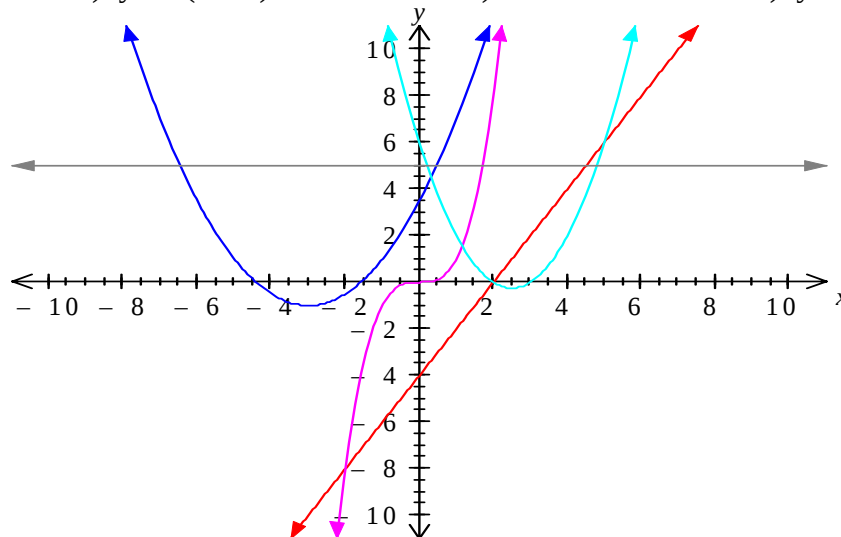
b) If the container below was to be filled from the same tap, draw a graph showing how the depth increases during the filling process.



Question 16 (5 marks)

Label each of the graphed equations from the choices listed below

- A) $y = x^3$ B) $y = x^2 - 5x + 6$ C) $y = 2x - 4$ D) $y = 0.5(x+3)^2 - 1$
 E) $y = 5$ F) $y = 2(x-3)^2 - 1$ G) $x = 5$ H) $y = -2x - 4$



Question 17 (4,2,1,1,1)

The following table shows a number of automotive engines and their quoted power outputs

Engine size (in litres)	Power in kilowatts (kw)
1.3	47
1.8	90
2.0	115
2.8	112
3.0	148
4.2	160
5.0	185
5.7	275

a) Graph the data on a scatter graph



b) State the equation of the line of best fit

c) Draw in the line of best fit

d) Predict the power output of a 2.2 litre engine

e) What size engine would have a power output of 200 kw

Question 18 (1,2,2,2,3 marks)

Solve:

a) $4x - 5 = x$

b) $x^2 - 49 = 0$

c) $2x^2 + 3x + 5 = 0$

d) $x^3 = 3^x$

e) $x + y = 10$ and $3x - 2y = -5$

Question 19 (5 marks)

Using the formula $s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}}$ for calculating the standard deviation, calculate the standard deviation for the following set of numbers correct to 2 decimal places
26, 29, 34, 24, 29, 18, 40, 32

Question 20 (1,1,2,2 marks)

The distance, d , travelled by a vertically falling object in t seconds is given by the formula $d = 4.9t^2$

- a) If it takes 5 seconds for a rock to hit the bottom of a well, how deep is the well?
- b) How far does the rock fall in the first second?
- c) How far does the rock fall in the second second?
- d) If the well was only half as deep, how long would it take the rock to hit the bottom?

Question 21 (2,1,2 marks)

The equation of a curve is a quadratic function. Give a possible equation of this curve if the curve has

- a) a turning point at (2,5)
- b) a line of symmetry at $x = 1$
- c) a turning point at (2,5) and a y intercept at (0,-3)

Question 22 (1,2 marks)

If, in an archaeological dig, human bones are found, these bones can be used to estimate the height the person was when alive. In particular, the bone in the the upper arm from elbow to shoulder, called the humerus, is a good indicator of height.

If the humerus is of length h cm then a reasonable estimate for the height of a male with this length humerus is: $(2.9h + 71)$ cm

and a reasonable estimate for the height of a female with this length humerus is: $(2.75h + 71)$ cm

a) In an archaeological dig the remains of a male are uncovered and the humerus is found to be 34cm long. Estimate the height of the male

b) What would be the expected humerus length of a female who is 1.81 metres tall?

Question 23 (4,2,2 marks)

Swan taxis charge a flagfall of \$3.60 and distance is charged at \$0.80 per km. A new taxi company called Willbecheepa, is planning to break into the market and plans to advertise much cheaper rates. Willbecheepa's flagfall rate is \$4.80 and distance rate is \$0.60 per km.

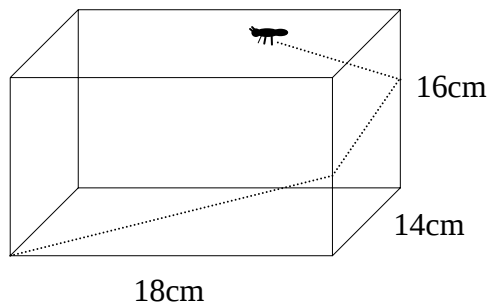
a) Create a single graph using the horizontal axis for distance, and the vertical distance for cost, showing the comparative costs of the two companies.

b) Using your graph or other means, which company is cheaper for a 7km taxi ride? By how much?

c) At what distance would the rival companies charge the same fare?

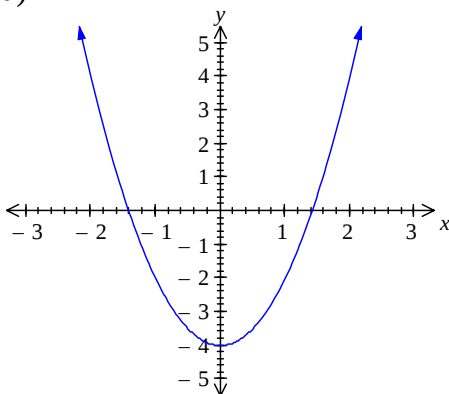
Question 24 (4 marks)

An ant starts in the bottom corner and walks up the side of a box, maintaining a constant angle of inclination of 12° as shown. If the ant has walked 45cm, what is his vertical height above the ground?

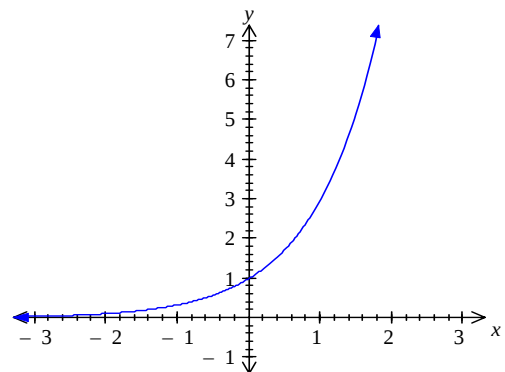
**Question 25 (2,2,2,2 marks)**

State the equation of the following graphs

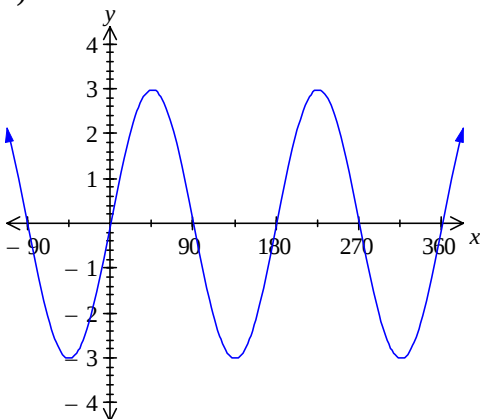
a)



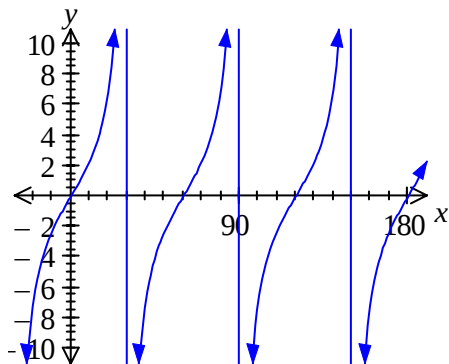
b)



c)

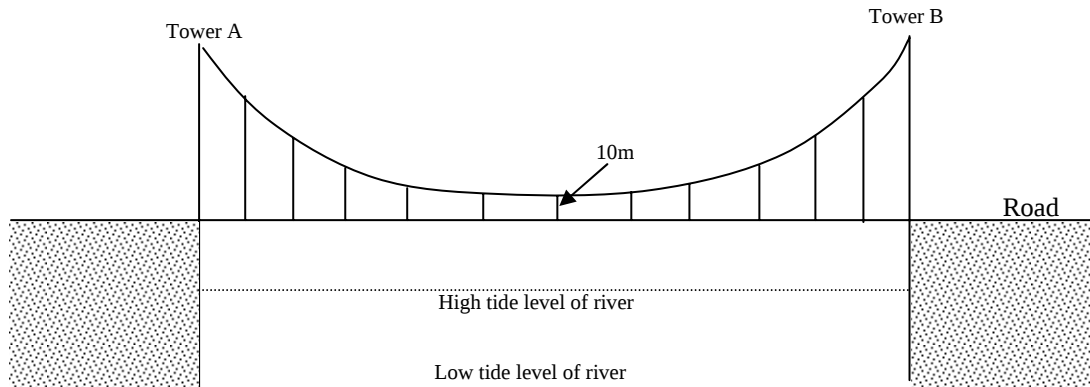


d)



Question 26 (2,2,3,1 marks)

A bridge support cable is suspended between two towers with vertical wires connecting the cable to the bridge as shown. The support cable, which is used to suspend a road above a river, conforms to the rule $h = \frac{1}{450}(d - 120)^2 + 40$. Where h is the height of the cable above the low tide mark, and d is the horizontal distance from tower A



a) Find the height of the road above the river at low tide given that the length of the centre wire is 10m long.

b) Given that the support cable is attached to the top of both towers, find the height of tower A above road level.

c) Given tower A and tower B are the same height, find the distance between the two towers

d) A yacht's mast extends 12m above the boat's waterline. If high tide is 8m above the low tide, will the yacht be able to safely pass under the bridge at all times?

Question 27 (3 marks)

If the mean of the following set of scores is 23, find the value of x .

15, 18, 22, 14, 31, 40, 7, 16, x , 20

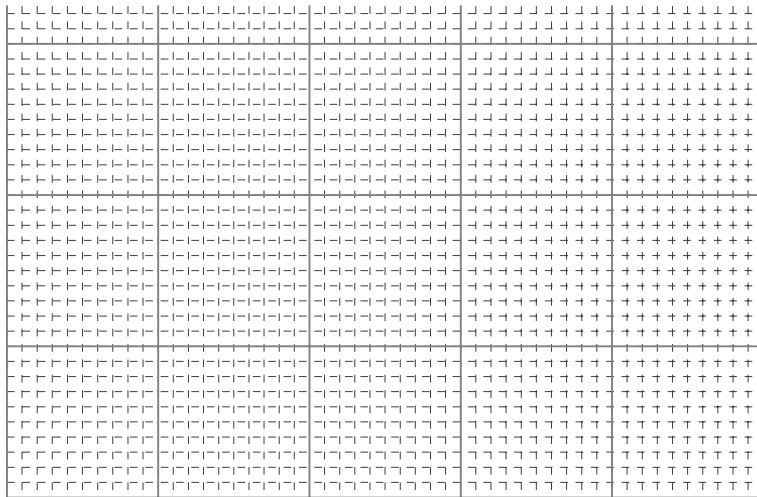
Question 28 (2,6,3,1 marks)

The following table shows the scores of a class of year 11 maths students in a test.

a) Fill in the cumulative frequency column on the table

Test Score	frequency	c.f.
20 - 24	2	
25 - 29	3	
30 - 34	5	
35 - 39	9	
40 - 44	6	
45 - 49	4	
50 - 54	1	

b) Draw the cumulative frequency graph for the above data



c) Determine the median and quartile test scores from the graph

d) If the top 15% of students are to receive an 'A' grade, determine the 'cut off' score for the 'A' grade.

END OF EXAM