Dr Oliver Mathematics
Mathematics Standard Grade: Credit Level
2007 Paper 2: Calculator
1 hour 20 minutes

The total number of marks available is 49.
You must write down all the stages in your working.

1. Alistair buys an antique chair for £600. (3)
   It is expected to increase in value at the rate of 4.5% each year.
   How much is it expected to be worth in 3 years?

2. Solve the equation (4)
   $$3x^2 - 2x - 10 = 0.$$
   Give your answer **correct to 2 significant figures**.

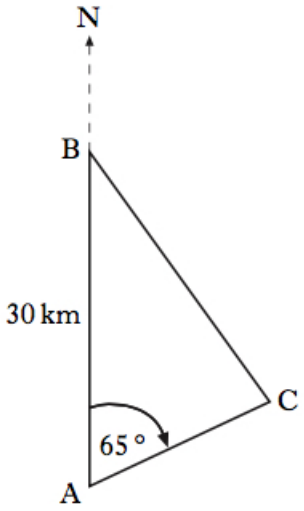
3. (a) During his lunch hour, Luke records the number of birds that visit his bird-table. (4)
   The numbers recorded last week were:
   $$28, 32, 14, 19, 18, 26, 31.$$
   Find the mean and standard deviation for this data.

   (b) Over the same period, Luke's friend, Erin also recorded the number of birds visiting her bird-table. (2)
   Erin's recordings have a mean of 25 and a standard deviation of 5.
   Make two valid comparisons between the friends' recordings.

4. Solve the inequality (2)
   $$\frac{x}{4} - \frac{1}{2} < 5.$$

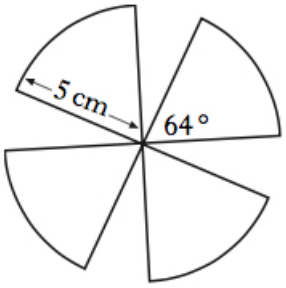
5. Mark takes some friends out for a meal. (3)
   The restaurant adds a 10% service charge to the price of the meal.
   The total bill is £148.50.
   What was the price of the meal?

6. Brunton is 30 kilometres due north of Appleton. (4)
   From Appleton, the bearing of Carlton is 065°.
   From Brunton, the bearing of Carlton is 153°.



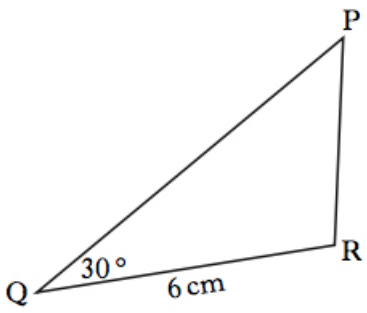
Calculate the distance between Brunton and Carlton.

7. A fan has four identical plastic blades. (3)



Each blade is a sector of a circle of radius 5 centimetres.
The angle at the centre of each sector is 64°.
Calculate the **total** area of plastic required to make the blades.

8. In triangle PQR, (3)
$QR = 6$ centimetres,
angle $PQR = 30°$,
and the area of triangle $PQR = 15$ square centimetres.



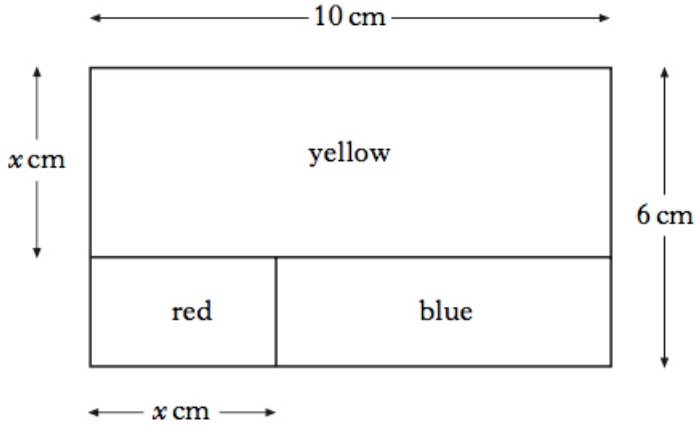
Calculate the length of PQ.

9. To make "14 carat" gold, copper, and pure gold are mixed in the ratio 5 : 7. (3)
A jeweller has 160 grams of copper and 245 grams of pure gold.
What is the maximum weight of "14 carat" gold that the jeweller can make?

10. Solve **algebraically** the equation (3)

$$5\cos x^\circ + 4 = 0, \qquad 0 \leqslant x < 360.$$

11. A decorator's logo is rectangular and measures 10 centimetres by 6 centimetres.
It consists of three rectangles: one red, one yellow, and one blue.



The yellow rectangle measures 10 centimetres by x centimetres.
The width of the red rectangle is x centimetres.

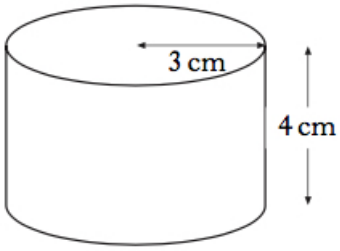
(a) Show that the area, A, of the blue rectangle is given by the expression (2)

$$A = x^2 - 16x + 60.$$

The area of the blue rectangle is equal to $\frac{1}{5}$ of the total area of the logo.

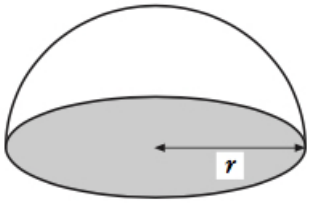
(b) Calculate the value of x. (4)

12. A cylindrical paperweight of radius 3 centimetres and height 4 centimetres is filled with sand.



(a) Calculate the volume of sand in the paperweight. (2)

Another paperweight, in the shape of a hemisphere, is filled with sand.



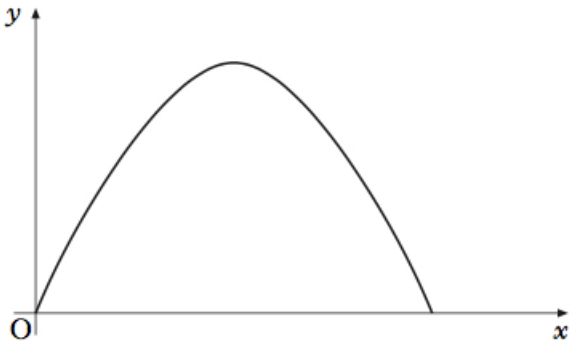
It contains the same volume of sand as the first paperweight.

(b) Calculate the radius of the hemisphere. (3)

13. The profit made by a publishing company of a magazine is calculated by the formula (4)

$$y = 4x(140 - x),$$

where y is the profit (in pounds) and x is the selling price (in pence) of the magazine. The graph below represents the profit y against the selling price x.



Find the maximum profit the company can make from the sale of the magazine.