Selected Questions – Set 1

1.

Oil is stored in either small drums or large drums.
The shapes of the drums are mathematically similar.

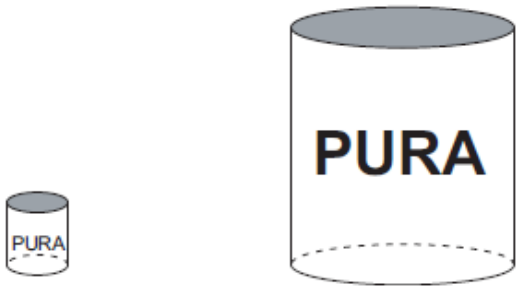


Diagram **NOT** accurately drawn

A **small** drum has a volume of 0.006 m^3 and a surface area of 0.2 m^2.

The height of a **large** drum is 3 times the height of a small drum.

(a) Calculate the volume of a large drum.

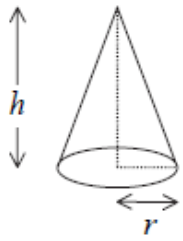
..... m^3
(2)

(b) The cost of making a drum is \$1.20 for each m^2 of surface area.
A company wants to store 3240 m^3 of oil in large drums.
Calculate the cost of making enough large drums to store this oil.

\$ .....
(4)

2.

A cone has base radius r cm and vertical height h cm.



The volume of the cone is 12π cm^3.
Find an expression for r in terms of h.

$r =$ .....

3.

A box contains 7 good apples and 3 bad apples.

Nick takes two apples at random from the box, **without** replacement.

(a) (i) Calculate the probability that both of Nick's apples are bad.

.....

(ii) Calculate the probability that at least one of Nick's apples is good.

.....

(4)

Another box contains 8 good oranges and 4 bad oranges.

Crystal keeps taking oranges at random from the box one at a time, **without** replacement, until she gets a good orange.

(b) Calculate the probability that she takes exactly three oranges.

.....

(2)

4.

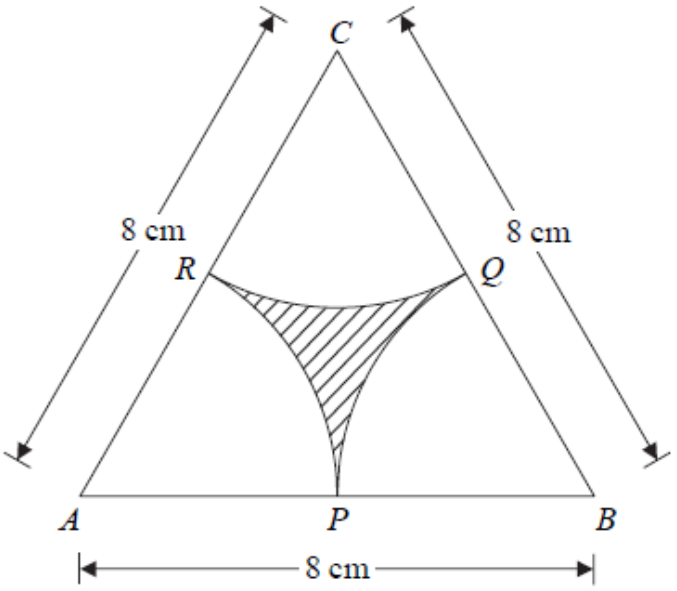


Diagram **NOT** accurately drawn

ABC is an equilateral triangle of side 8 cm.
With the vertices *A*, *B* and *C* as centres, arcs of radius 4 cm are drawn to cut the sides of the triangle at *P*, *Q* and *R*.
The shape formed by the arcs is shaded.

(a) Calculate the perimeter of the shaded shape.
Give your answer correct to 1 decimal place.

..... cm
(3)

(b) Calculate the area of the shaded shape.
Give your answer correct to 1 decimal place.

..... cm^2
(4)

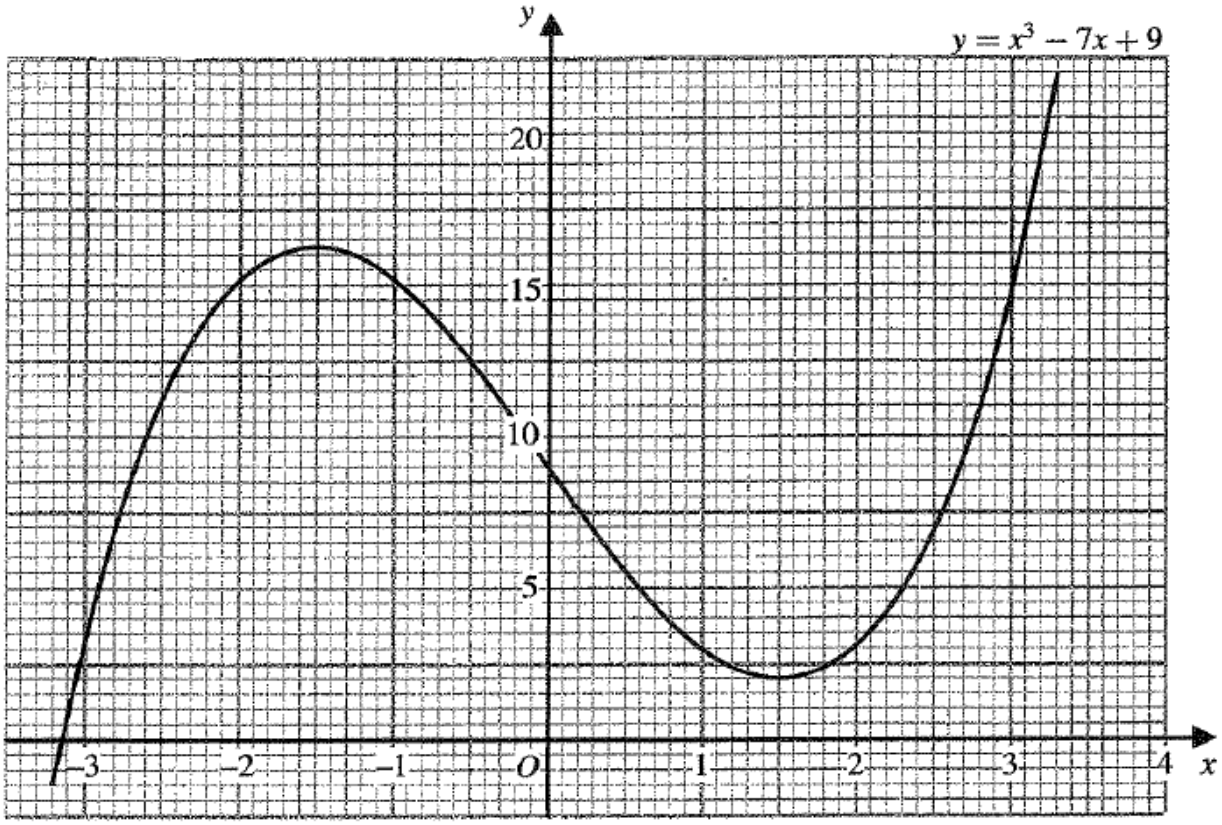
5.

There are 10 beads in a box.
n of the beads are red.
Meg takes one bead at random from the box and does not replace it.
She takes a second bead at random from the box.
The probability that she takes 2 red beads is $\frac{1}{3}$.

Show that $n^2 - n - 30 = 0$

6.

Part of the graph of $y = x^3 - 7x + 9$ is shown on the grid.



The graph of $y = x^3 - 7x + 9$ and the line with equation $y = k$, where k is an integer, have 3 points of intersection.

(a) Find the greatest possible value of the integer k.

$k =$ .....

(1)

(b) By drawing a suitable straight line on the grid, find estimates of the solutions of the equation $x^3 - 6x - 2 = 0$.
Give your answers correct to 1 decimal place.

.....

(3)

7.

Simplify fully $\frac{2}{x-1}+\frac{x-11}{x^2+3x-4}$

8.

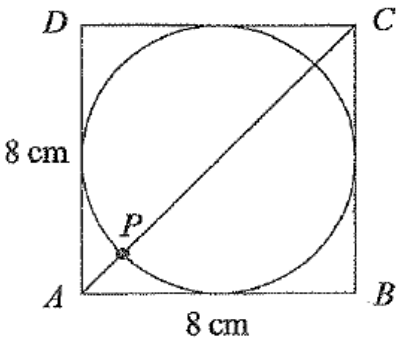


Diagram NOT accurately drawn

The diagram shows a circle of radius 4 cm inside a square $ABCD$ of side 8 cm.
P is a point of intersection of the circle and the diagonal AC of the square.

(a) Show that $AP = 1.66$ cm, correct to 3 significant figures.

(4)

(b) Calculate the length of DP.
Give your answer correct to 3 significant figures.

..... cm

(3)

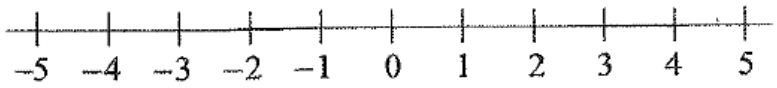
9.

(a) Solve the inequality $x^2 \leqslant 4$

.....

(2)

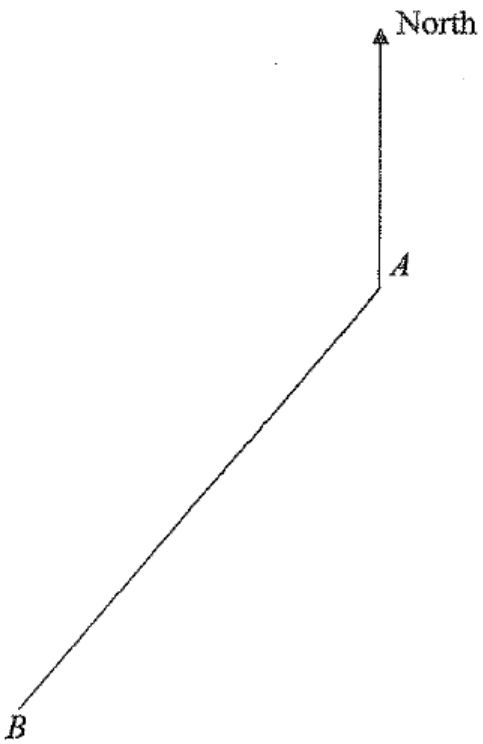
(b) On the number line, represent the solution set of $x^2 \leqslant 4$



(2)

10.

The diagram shows two towns, A and B.



(a) Measure the bearing of B from A.

.....°

(2)

(b) A plane flies along the perpendicular bisector of the line AB.
Use ruler and compasses to construct the perpendicular bisector of AB.
Show all your construction lines.

(2)

(c) The bearing of another town, C, from A is 120°.
Work out the bearing of A from C.

.....°

(1)