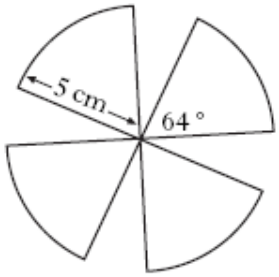
Banker KU Questions 4

1. A fan has four identical plastic blades.

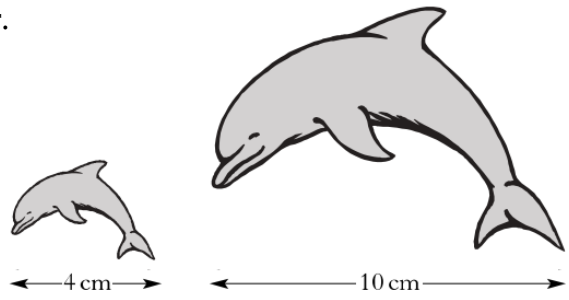


Each blade is a sector of a circle
of radius 5 centimetres.

The angle at the centre of each sector is 64°

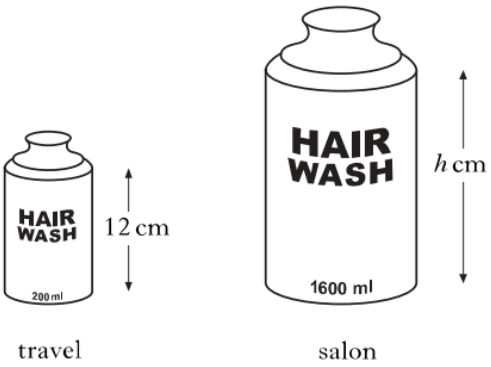
Calculate the total area of plastic required to make the blades. **3 KU**

2. Two fridge magnets are mathematically similar.
One fridge magnet is 4 cm long
and the other is 10 cm long.



The area of the smaller magnet is 18 cm^2.
Calculate the area of the larger magnet. **3 KU**

3. Shampoo is available in travel size and salon size bottles.
The bottles are mathematically similar.



The travel size contains 200 ml and is 12 cm in height.
The salon size contains 1600 ml.

Calculate the height of the salon size bottle. **3 KU**

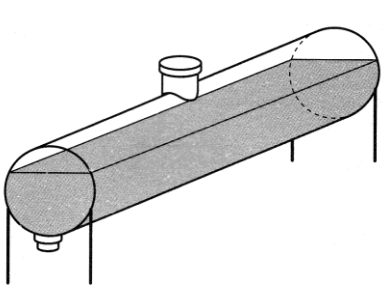
4. (a) Solve algebraically the equation

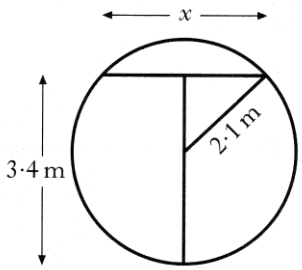
$$\sqrt{3}\sin x - 1 = 0 \qquad 0 \leq x \leq 360°$$ **3 KU**

(b) Hence write down the solution of the equation

$$\sqrt{3}\sin x - 1 = 0 \qquad 0 \leq x \leq 90°$$ **1 RE**

5. An oil tank has a circular cross section of radius 2.1 metres.
It is filled to a depth of 3.4 metres.





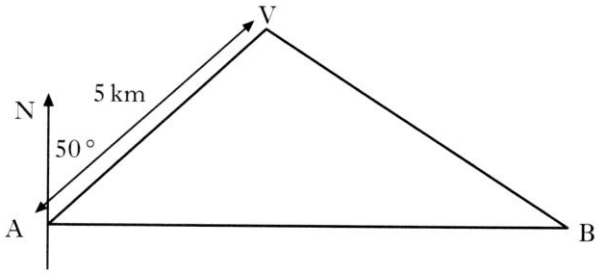
(a) Calculate x, the width in metres of the oil surface. **3 KU**

(b) What other depth of oil would give the same surface width. **1 RE**

6. David walks on a bearing of 050° from hostel A to a viewpoint V,
5 kilometres away.

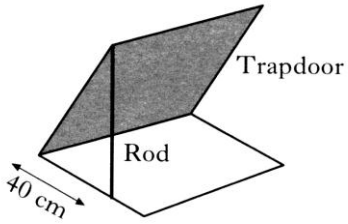
Hostel B is due east of hostel A.

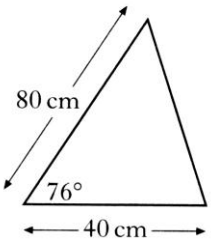
Susie walks on a bearing of 294° from hostel B to the same viewpoint.



Calculate the length of AB, the distance between the two hostels. **5 KU**

7. A square trapdoor of side 80 centimetres is held open by a rod as shown.



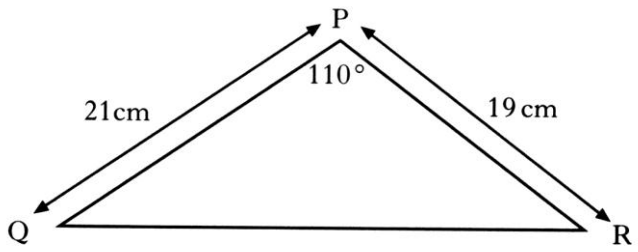


The rod is attached to the corner of the trapdoor and placed 40 centimetres along the edge of the opening.

The angle between the trapdoor and the opening is 76°.

Calculate the length of the rod to 2 significant figures. **4 KU**

8.



Calculate the area of triangle PQR. **4 KU**

9. Solve algebraically the equation

$$4\sin x^\circ + 1 = -2 \qquad 0 \leq x < 360$$ **3 KU**

10. (a) Factorise

$$4x^2 - y^2$$ **1 KU**

(b) Hence simplify

$$\frac{4x^2 - y^2}{6x + 3y}$$ **2 KU**

11. Factorise fully

$$5x^2 - 45$$ **2 KU**

12. Express as a single fraction in its simplest form

$$\frac{1}{p} + \frac{2}{p+5}$$ **2 KU**

13. Solve the equation

$$\frac{2}{x} + 1 = 6$$ **3 KU**

14. Given $f(x) = 4\sqrt{x} + \sqrt{2}$

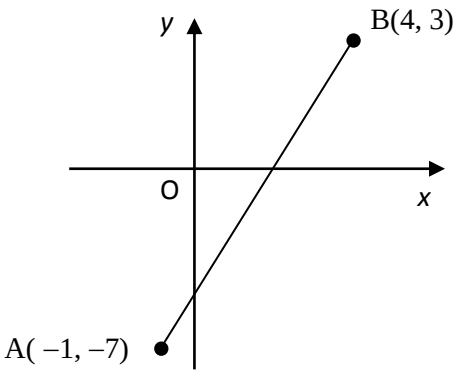
(a) Find the value of $f(72)$ as a surd in its simplest form. **3 KU**

(b) Find the value of t, given that $f(t) = 3\sqrt{2}$. **3 RE**

15. Given $P = \dfrac{2(m-4)}{3}$

Change the subject of the formula to m. **3 KU**

16. In the diagram, A is the point (–1, 7) and B is the point (4, 3).



(a) Find the gradient of the line AB. **1 KU**

(b) AB cuts the *y*-axis at the point (0, –5).
Write down the equation of the line AB **1 KU**

(c) The point (3*k*, *k*) lies on AB
Find the value of k. **2 RE**

17. Aaron saves 50 pence and 20 pence coins in his piggy bank.

Let *x* be the number of 50 pence coins in his bank.

Let *y* be the number of 20 pence coins in his bank.

(a) There are 60 coins in his bank.
Write down an equation in *x* and *y* to illustrate this information. **1 KU**

(b) The total value of the coins is £17.40.
Write down another equation in *x* and *y* to illustrate this information. **1 KU**

(c) Hence find algebraically the number of 50 pence coins Aaron has in his piggy bank. **3 RE**

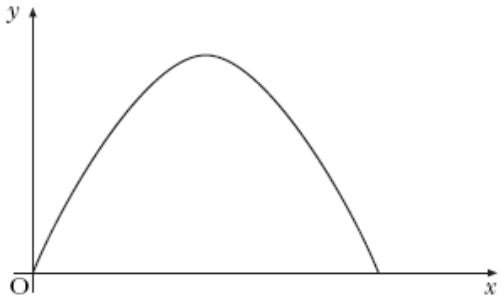
18. Solve the equation

$$2x^2 + 3x - 7 = 0$$

Give your answers correct to 1 decimal place. **4 KU**

19. The diagram shows part of the graph of a quadratic function, with equation of the form

$$y = k(x-a)(x-b)$$



The graph cuts the *y*-axis at (0, –6) and the *x*-axis at (–1, 0) and (3, 0)

(a) Write down the values of a and b. **2 KU**

(b) Calculate the value of k. **2 KU**

(c) Find the coordinates of the minimum turning point of the function **2 RE**

20. Given that $x^2 - 10x + 18 = (x-a)^2 + b$

Find the values of a and b. **3 KU**

21. (a) Simplify $2\sqrt{75}$ **2 KU**

(b) Evaluate $2^0 + 3^{-1}$ **2 KU**

22. (a) Simplify $2a \times a^{-4}$ **1 KU**

(b) Solve for x. $\sqrt{x} + \sqrt{18} = 4\sqrt{2}$ **3 KU**

23. Solve the equation $3x + 1 = \frac{x-5}{2}$ **3 KU**

24. Factorise fully $2m^2 - 18$ **2 KU**

25. Given that $f(x) = 5 - x^2$ evaluate $f(-3)$ **2 KU**

26. Olga normally runs a total distance of 28 miles per week.

She decides to increase her distance by 10% a week for the next four weeks.

How many miles will she run in the fourth week ? **3 KU**

27. A car is valued at £3780.

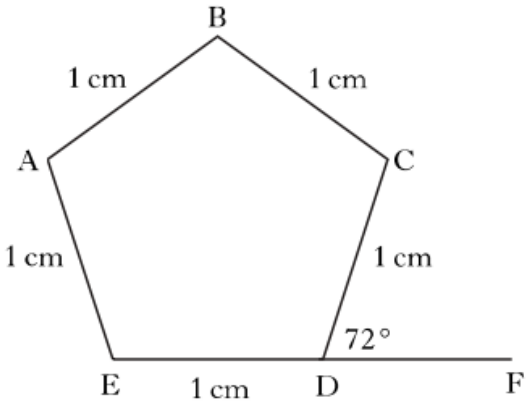
This is 16% less than last year's value.

What was the value of the car last year ? **3 KU**

28. ABCDE is a regular pentagon with each side 1 cm.

Angle CDF is 72°.

EDF is a straight line.

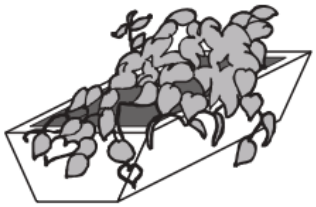


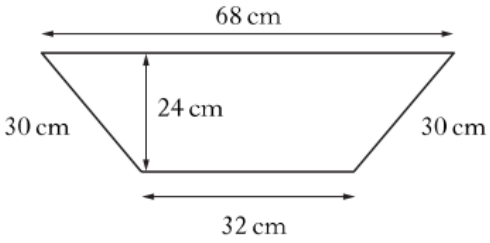
(a) Write down the size of angle ABC **1 KU**

(b) Calculate the length of AC **3 KU**

29. A flower planter is in the shape of a prism.

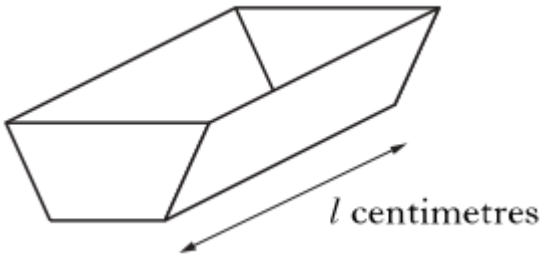
The cross section is a trapezium with dimensions shown.





(a) Calculate the area of the cross-section of the planter. **2 KU**

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



Calculate the length *l* centimetres, of the planter. **3 RE**

30. Tom and Samia are paid the same hourly rate.

Harry is paid $\frac{1}{3}$ more per hour than Tom.

Tom worked 15 hours, Samia worked 8 hours and Harry worked 12 hours.

They were paid a total of £429.

How much was Tom paid ? **3 KU**

31. Evaluate 40% of £11.50 - £1.81 **2 KU**

32. Evaluate $\frac{2}{5} \div 1\frac{1}{10}$ **2 KU**

33. Change the subject of the formula to s.

$$t = \frac{7s + 4}{2}$$ **3 KU**

34. A bag contains 27 marbles. Some are black and some are white.

The probability that a marble chosen at random is black is $\frac{4}{9}$

(a) What is the probability that a marble chosen at random is white ? **1 KU**

(b) How many white marbles are in the bag ? **1 RE**

35. Cleano washing powder is on special offer.

Each box on special offer
contains 20% more powder than the standard box.

A box on special offer contains 900 grams of powder.

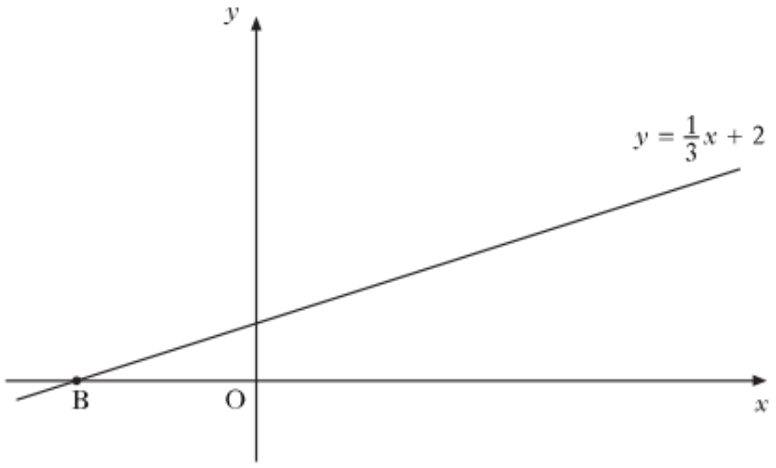
How many grams of powder does the standard box contain ? **3 KU**

36. (a) Simplify $\sqrt{2} \times \sqrt{18}$ **1 KU**

(b) Simplify $\sqrt{2} + \sqrt{18}$ **1 KU**

(c) Hence show that $\dfrac{\sqrt{2} \times \sqrt{18}}{\sqrt{2} + \sqrt{18}} = \dfrac{3\sqrt{2}}{4}$ **2 KU**

37. Part of the graph of the straight line with equation $y = \frac{1}{3}x + 2$ is shown below.



(a) Find the coordinates of point B. **2 KU**

(b) For what values of x is $y < 0$ **1 RE**

38. It is estimated that an iceberg weights 84 000 tonnes.
As the iceberg moves into warmer water, its weight decreases by 25% each day.
What will the iceberg weigh after 3 days in the warmer water ?
Give your answer **correct to three significant figures.** **4 KU**

39. Expand and fully simplify $x(x-1)^2$ **2 KU**

40. A machine is used to put drawing pins into boxes.
A sample of 8 boxes is taken and the number of drawing pins in each is counted.

The results are: 102 102 101 98 99 101 103 102

(a) Calculate the mean and standard deviation of this sample **3 KU**

(b) A sample of 8 boxes is taken from another machine.
This sample has a mean of 103 and a standard deviation of 2.1
Write down two valid comparisons between the samples. **2 RE**

41. Use the quadratic formula to solve the equation:

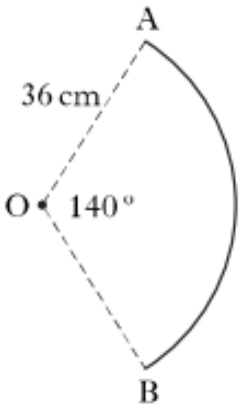
$$3x^2 - 5x + 7 = 0$$

Give your answers correct to 1 decimal place. **4 KU**

42. A circle, centre O, has radius 36 cm.

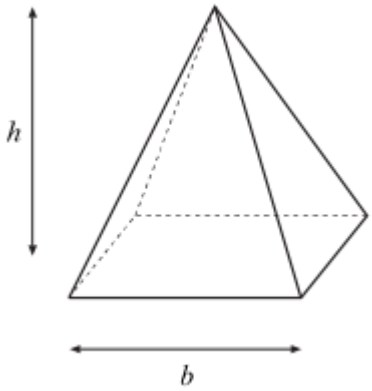
Part of this circle is shown.

Angle AOB = 140°



Calculate the length of arc AB **3 KU**

43. The height, h , of a square based pyramid varies directly as its volume V and inversely as the square of the length of the base, b.



(a) Write down an equation connecting h, V and b. **2 KU**

A square-based pyramid of height 12 cms has a volume of 256 cm^3 and length of base 8 cm.

(b) Calculate the height of a square-based pyramid of volume 600 cm^3 and length of base 10 cm. **3 KU**

44. The depth of water, D metres, in a harbour is given by the formula

$$D = 3 + 1.75 \sin 30h°$$

Where h is the number of hours after midnight.

(a) Calculate the depth of water at 5 am. **2 KU**

(b) Calculate the maximum difference in depth of the water in the harbour.
Do not use a trial and improvement method. **2 RE**

45. Evaluate $4\frac{1}{3} - 1\frac{1}{2}$ **2 KU**

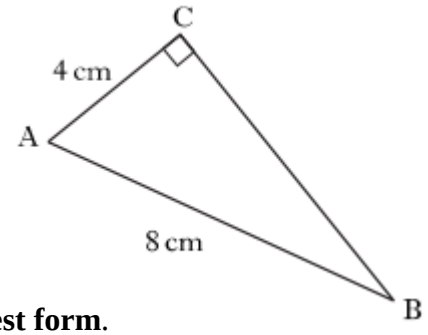
46. (a) Factorise $x^2 - 4y^2$ **1 KU**

(b) Expand and simplify $(2x-1)(x+4)$ **1 KU**

(c) Expand $x^{\frac{1}{2}}\left(3x + x^{-2}\right)$ **2 KU**

47. In triangle ABC:

- Angle ACB = 90°
- AB = 8 cm
- AC = 4 cm



Calculate the length of BC.

Give your answer **as a surd in its simplest form**. **3 KU**

48. There are 4 girls and 14 boys in a class.

A child is chosen at random and is asked to roll a die, numbered 1 to 6.

Which of these is more likely ?

A: the child is female

OR

B: the child rolls a 5

Justify your answer **3 RE**

49. A formula used to calculate the flow in a pipe is

$$f = \frac{kd^2}{20}$$

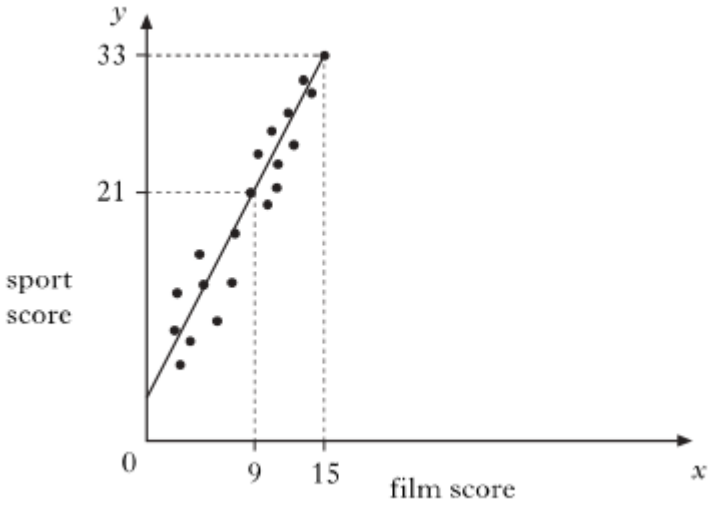
Change the subject of the formula to d. **3 KU**

50. One atom of gold weight 3.27×10^{-22} grams.

How many atoms will there be in 1 kg of gold ?

Give your answer **in scientific notation correct to 2 significant figures.** **3 KU**

51. Teams in a quiz answerr questions on film and sport.
This scatter graph shows the scores of some of the teams.



A line of best fit is drawn as shown above.

(a) Find the equation of this straight line. **4 KU**

(b) Use this equation to estimate the sport score for a team
With a film score of 20 **2 RE**

52. (a) The air temperature, t° Celsius, varies inversely as the square of
The distance, d metres, from a furnace.

Write down a formula connecting t and d. **2 KU**

(b) At a distance of 2 metres from the furnace, the air temperature is 50 °C.

Calculate the air temperature at a distance of 5 metres from the furnace. **3 KU**