GCSE MATHEMATICS

S21-C300

With Calculator Assessment Resource G

Foundation Tier

Formula list

Area and volume formulae

Where r is the radius of the sphere or cone, l is the slant height of a cone and h is the perpendicular height of a cone:

Curved surface area of a cone = πrl

Surface area of a sphere = $4\pi r^2$

Volume of a sphere = $\frac{4}{3}\pi r^3$

Volume of a cone = $\frac{1}{3}\pi r^2 h$

Kinematics formulae

Where a is constant acceleration, u is initial velocity, v is final velocity, s is displacement from the position when $t = 0$ and t is time taken:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

1. *(a)* Use $A = \frac{6B}{8}$ to find the value of A when $B = 34$. [2]

$A = 6B/8 \rightarrow A = 6(34)/8 = 25.5$

(b) The cost to hire a bike is given by the formula:

Cost = £14 + £5.75 × number of whole days hired

Tom has £80 to spend.
He wants to hire a bike for as many days as possible.

For how many whole days can Tom afford to hire a bike? [3]

x = days

$£80 = £14 + £5.75x$

$£66 = £5.75x \rightarrow x = \frac{£66}{£5.75}$

$x = 11.47826087$

So whole days = 11

2.

Pack of sandwiches £2.74

Apples 62p each

(a) (i) Ami buys a pack of sandwiches and an apple for herself and the same for each of her three children.

How much does this cost altogether? [3]

4 total people same thing

4 (£2.74 + £0.62) = £13.44

(ii) Ami pays with a £20 note.

How much change should she get? [1]

£20 − £13.44 = £6.56

Drink £1.15

(b)

A 'Meal Deal' gives a pack of sandwiches, an apple and a drink for £3.79.
Alex buys one 'Meal Deal'.

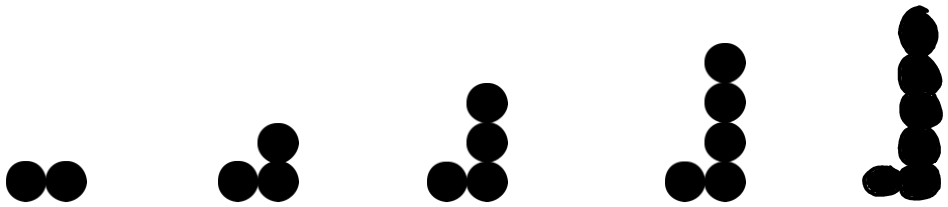
How much cheaper is this than buying the three items separately? [2]

meal deal = £3.79 separate = (2.74 + 0.62 + 1.15)
= £4.51

£4.51 − £3.79 = £0.72 cheaper

3. *(a)* Here are the first four patterns in a sequence.

Pattern **1** **2** **3** **4** **5**



(i) Draw pattern 5. [1]

(ii) How many circles will be in pattern 6? [1]

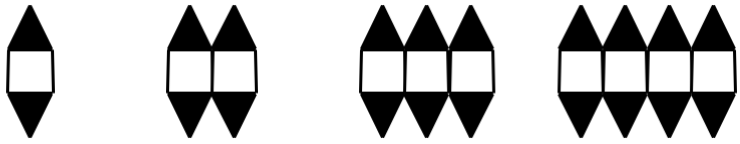
7

(iii) Which pattern uses exactly 99 circles? [1]

$x + 1 = 99 \rightarrow x = 98$

(b) Here are the first four patterns in a different sequence.

Pattern **1** **2** **3** **4**

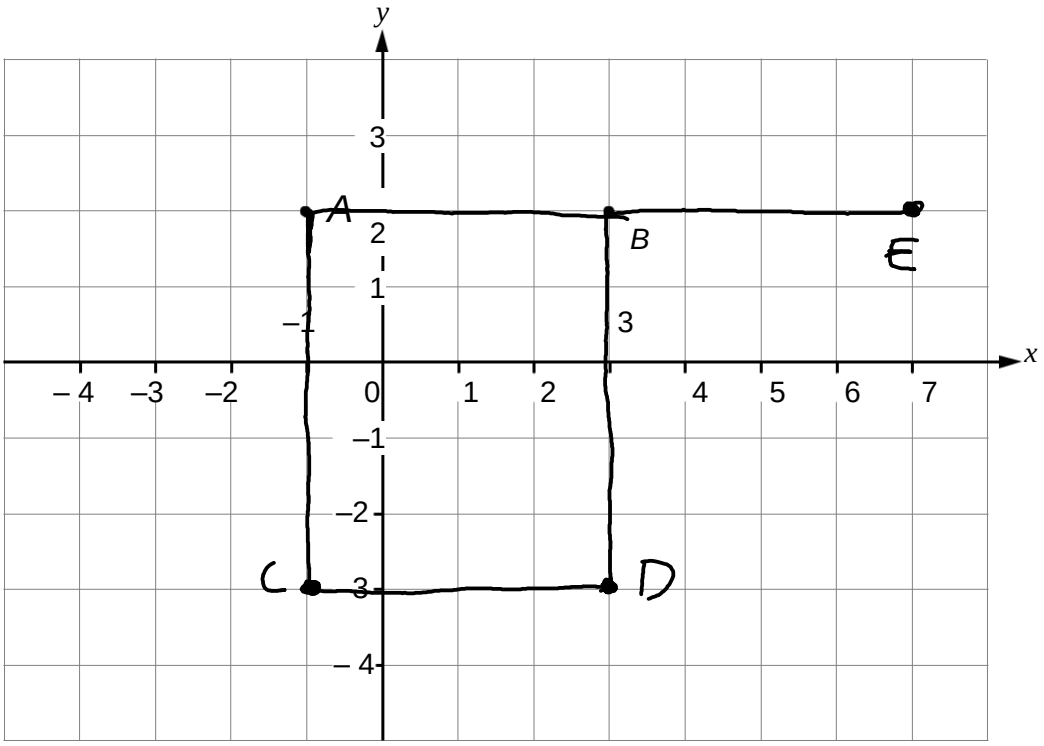


Write down the rule connecting the number of triangles with the number of squares in each pattern. [1]

squares are half of triangles in each sequence

Number of triangles = 2 x squares

4. Points *A* and *B* are shown on the 1 cm grid below.



(a) *ABCD* is a rectangle with area 20 cm^2.

Mark the points *C* and *D* on the grid. [2]

20 ÷ 4 = 5 cm

(b) (i) *B* is the midpoint of *AE*.

Mark the point *E* on the grid. [1]

(ii) Write down the coordinates of the point *E*. [1]

E is the point (7 , 2)

5. Jack sells ice-cream cones at a beach cafe.
Each ice-cream cone has **two** scoops of ice cream.

(a) The scoops can be the same or different flavours.

There are three possible flavours to choose from:

- chocolate (C),
- vanilla (V),
- strawberry (S).

List all the possible flavour combinations for two scoops of ice cream. [2]

CC CV CS
VV VS = 6 combinations
SS

(b) Two scoops of vanilla ice cream is the most popular.
Jack gets 125 single scoops of vanilla ice cream from one tub. Each tub costs £43.50.
Jack needs to buy enough tubs to make 1300 of his two-scoop vanilla ice-cream cones.

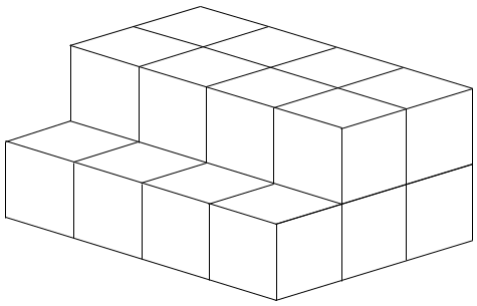
What is the least amount Jack will need to pay? [5]

1300 two scoops = 1300 x 2 single scoops = 2600

2600 ÷ 125 = 20.8 → 21 tubs

43.50 x 21 = £913.50

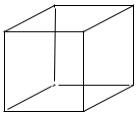
6. *(a)* This solid prism is made from identical cubes. Each cube has sides of length 1 cm.



Give the dimensions of a cuboid that could be made with the same number of cubes. [1]

2 × 2 × 5

(b) The total surface area of a different cube is 144 cm^2.



To work out the side length of this cube, Mai does the following calculations:

$\sqrt{144} = 12$

$12 \div 6 = 2$

Mai's method is incorrect.

Explain the mistake that Mai has made. [1]

She is meant to divide 144 by 6 for SA of each face → $144 \div 6 = 24$

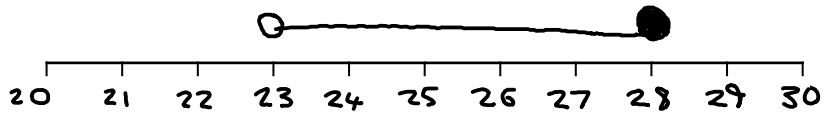
Then $\sqrt{24} = 2\sqrt{6}$

7. *(a)* n is a whole number where $-4 \leq 2n < 6$..

Write down all the possible values of n. [2]

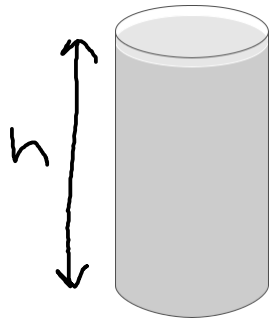
$-2, -1, 0, 1, 2$

(b) Represent the inequality $23 < x \leq 28$ on this number line. [2]



8. A cylindrical glass contains 500 cm^3 of water.

The glass has an internal radius of 3·5 cm.



Calculate the height of the water in the glass. [3]

$500\ cm^3 = h \times \pi r^2$

$500 = h \times \pi (3.5)^2 \rightarrow 500 = 49/4\ \pi \times h$

$h = \frac{500}{49/4\pi} = 12.99224025$

$= 13\ cm$

9. *ABCD* is a parallelogram.

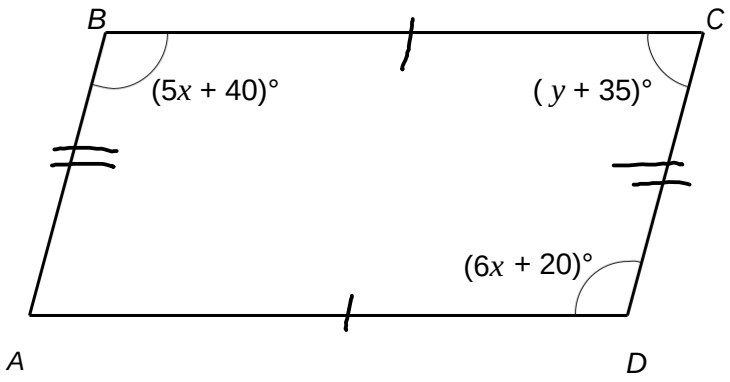


Diagram not drawn to scale

Work out the value of x and the value of y.
You must show all your working. [5]

$5x + 40 = 6x + 20 \rightarrow x = 20$

$360 - (5x + 40 + 6x + 20)$

$360 - (140 + 140) = 80^\circ$ remaining angles

$80 \div 2 = 40$ $\quad 40 = y + 35 \rightarrow y = 5^\circ$

$x =$ 20 $\quad y =$ 5