GCSE MATHEMATICS

S21-C300

With Calculator Assessment Resource H

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:

$$\text{Curved surface area of a cone} = \pi r l$$

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

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

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

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)* At 8 a.m. the temperature in a new freezer is 22 °C.
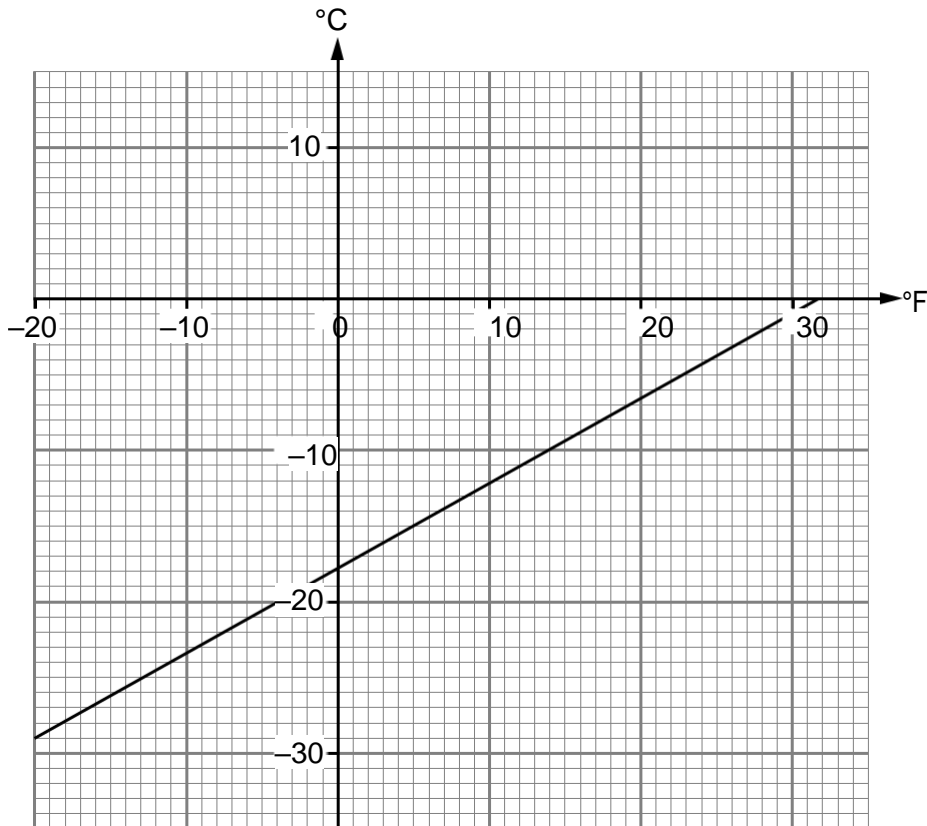The temperature decreases at 4 °C per hour.

At what time will it reach −14 °C? [2]

$$14 + 22 = 36$$

$$36 \div 4 = \underline{9 \text{ hours}} \quad 8am + 9 = \underline{\underline{5pm}}$$

(b) The graph below can be used to convert between degrees Fahrenheit (° F) and degrees Celsius (° C).

Use the graph to convert the temperature −14 °C to ° F. [1]

$$\underline{\underline{7°F}}$$

2. Fabric is sold from rolls.
All the rolls contain fabric of the same width.

Any length can be cut from a roll of fabric.

Tien buys:

- a 1·8 m length of flowered fabric,

- a 3·2 m length of plain fabric.

Flowered fabric costs £12.50 for one metre.
Tien spends £58.50 altogether.

Show that plain fabric costs £11.25 for one metre. [3]

$$1.8 \times 12.50 = £22.50 \text{ flowered fabric}$$

$$£58.50 - 22.50 = £36$$

$$£36 \div 3.2 = £11.25 \text{ for metre of plain fabric}$$

3. *(a)* The original price of a car is £6500.

It is sold at a 12·5% discount.
Calculate the discounted price. [3]

$$6500 \times 0.875 = £5687.5$$

Discounted price = £ .... 5687·5 ....

(b) Emma borrows £875 to pay for a new computer.
She pays simple interest on the loan at 6% per year for 3 years.

Calculate the total amount of interest Emma pays. [2]

$$875 \times \frac{6}{100} = 52.5 \text{ interest per year}$$

$$52.5 \times 3 = 157.5$$

Interest = £ .... 157·5 ....

(c) Asha buys a bike.
She sells it for three times what she paid for it.

What percentage profit has Asha made? [1]

Bought for £100   Sold £300   profit £200

$$200/100 \times 100 = 200\%$$

Percentage profit = ... 200 .... %

4. *(a)* 135 women and 150 men were asked to complete a survey.
44 of the women completed the survey.
32 % of the men completed the survey.

Which of the following statements is correct?
You must show all your working. [3]

A greater proportion of men than women completed the survey. ☐

A greater proportion of women than men completed the survey. ✓

$$\frac{44}{135} \times 100 = 0.3259...so\ 32.6\%.$$
and $32.6 > 32$.

(b) 225 people took part in a different
survey. 40 % were women.
20 % of the women were over 50 years of age.

How many women over 50 years of age took part in this survey? [3]

$40/100 \times 225 = 90$ women took survey

$20/100 \times 90 = 18$ women over 50

5.

200 ml	375 ml	500 ml
98p	£1.80	£2.30

Which size of bottle offers the best value for money?

200 ml ☐   375 ml ☐   500 ml ☑

Show how you decide.   [3]

200ml ⟶ £0.98/200 = £0.0049 /ml
375ml ⟶ £1.80/375 = £0.0048 /ml
500ml ⟶ £2.30/500 = £0.0046 /ml

6. *(a)* Sam and Jody share £366 in the ratio 1 : 3.

How much money does Jody get? [2]

$$366 \div 4 = £91.50$$

Sam : Jody

$$91.50 : 3 \times 91.50 = £274.50$$

Jody gets £ .... 274.50 ....

(b) Maria is 4 years old.
She is half Connor's age.

What will be the ratio of their ages in 2 years' time?
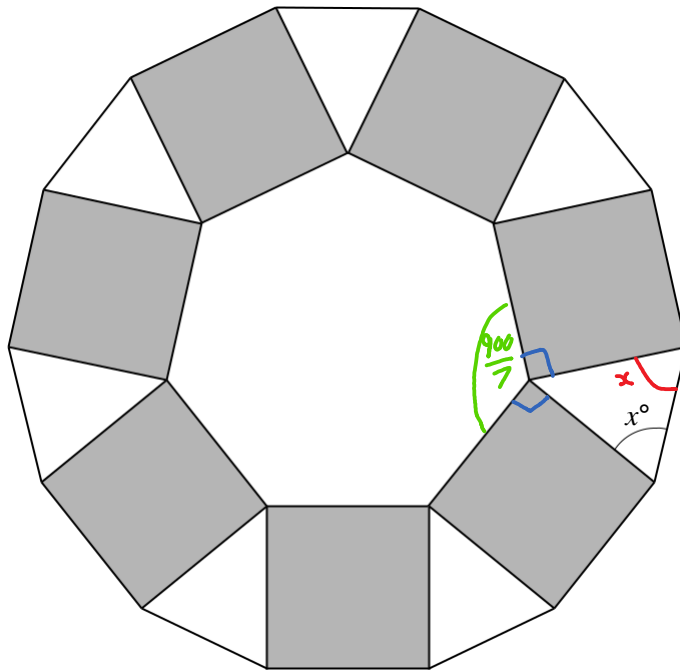Give your answer in its simplest form. [2]

Maria = 4   Connor = 8

2 years later ⟶ Maria = 6 : Connor = 10

3 : 5

Maria's age : Connor's age will be .... 3 .... : .... 5 ....

7.

This pattern is made from a regular seven-sided polygon surrounded by squares and isosceles triangles.

Show that the value of x is 64·3 correct to 1 decimal place. [4]

You must show all your working.

Sum of interior of 7 sided polygon → $180 \times (7-2) = 900°$

each angle in 7 sided polygon → $\left(\dfrac{900}{7}\right)°$

Top angle of triangle $= 360 - \left(\dfrac{900}{7} + 90 + 90\right) = \left(\dfrac{360}{7}\right)°$

$180 - \left(\dfrac{360}{7}\right) = 2x$

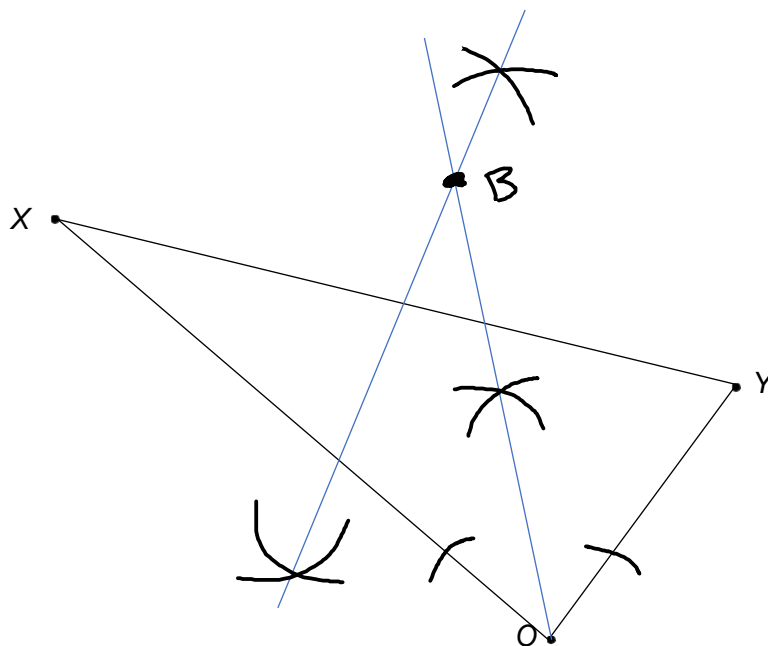$2x = \dfrac{900}{7}$ $x = \underline{\underline{64.3°}}$

8. Cheng stands at *O* and rolls a ball along the horizontal

ground. The ball stops at point *B*, which:

- is equidistant from *X* and *Y*,
- lies on the bisector of angle *XOY*.

Use a ruler and a pair of compasses to **construct** suitable lines and arcs to show the position of point *B*.

Construction arcs must be clearly shown. [5]

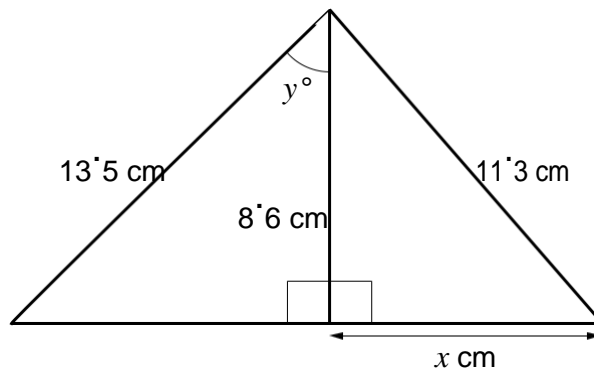**9.** The diagram shows two right-angled triangles.

Diagram not drawn to scale

(a) Calculate the value of x. [3]

$$a^2 + b^2 = c^2$$

$$(8.6)^2 + (x)^2 = (11.3)^2$$

$$(x)^2 = (11.3)^2 - (8.6)^2 = \frac{5373}{100}$$

$$x = \sqrt{\frac{5373}{100}} = 7.330075034$$

$$= 7.3 \text{ cm}$$

(b) Calculate the value of y. [3]

$$\cos y = 8.6 / 13.5$$

$$y = 50.42876864° = 50.4°$$