GCSE MATHEMATICS

S21-C300

Non-Calculator Assessment Resource N

Higher 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. In 2018, the total volume of ice in the Greenland ice sheet was $2{\cdot}99 \times 10^6$ km^3.
The total surface area of the ice sheet was $1{\cdot}799 \times 10^6$ km^2.

Assuming that the depth of the ice was constant for the whole ice sheet, **estimate** the depth of the ice in 2018.
You must state the units of your answer. [3]

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Depth of ice = ... Units .....

2. *(a)* Delyth borrows £3450 from a family member who charges her 2% per year simple interest.
She pays all the money back in one payment after 1 year 3 months.

How much interest does Delyth pay? [3]

Interest £ .....

(b) Aiden invested £65 for 5 years at a rate of r % simple interest per year.
No extra money was paid in and no money was withdrawn during these 5 years.
At the end of the 5 years he received £9.75 interest in total.

Find the value of r. [3]

r = ...

3. Shania has two pieces of ribbon.

One piece is $5\frac{1}{4}$ metres long.

The difference between the lengths of the two pieces is $2\frac{9}{20}$ metres.

Work out the **two** possible lengths of the other piece of ribbon.
Give each of your answers as a mixed number in its simplest form. [4]

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4. Huw has a maths test.

(a) For the first question, Huw divides 752 by a whole number.
His answer, which is correct, is 25 remainder 27.

What whole number did Huw divide by? [3]

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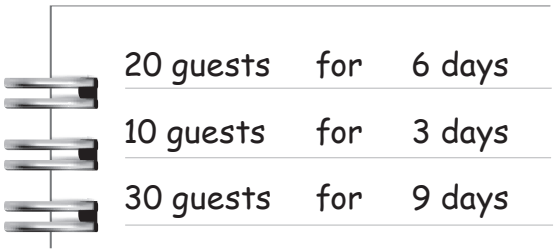
(b) The second question is:

The only food provided for guests at Seaview Hotel is breakfast. The hotel has enough food to make breakfast for 20 guests for 6 days. How long would the food last 30 guests? You may assume each guest eats the same amount of food for breakfast.

Here is Huw's working.



(i) Without working out the correct answer, explain why Huw's answer of 9 days is incorrect. [1]

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(ii) Work out the correct answer. [2]

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..... days

5. *(a)* Find the value of $\left(\frac{1}{5}\right)^{-3}$. [2]

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(b) Find the value of $256^{\frac{3}{4}}$. [2]

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(c) **Estimate** the value of $50^{\frac{1}{2}}$. [1]

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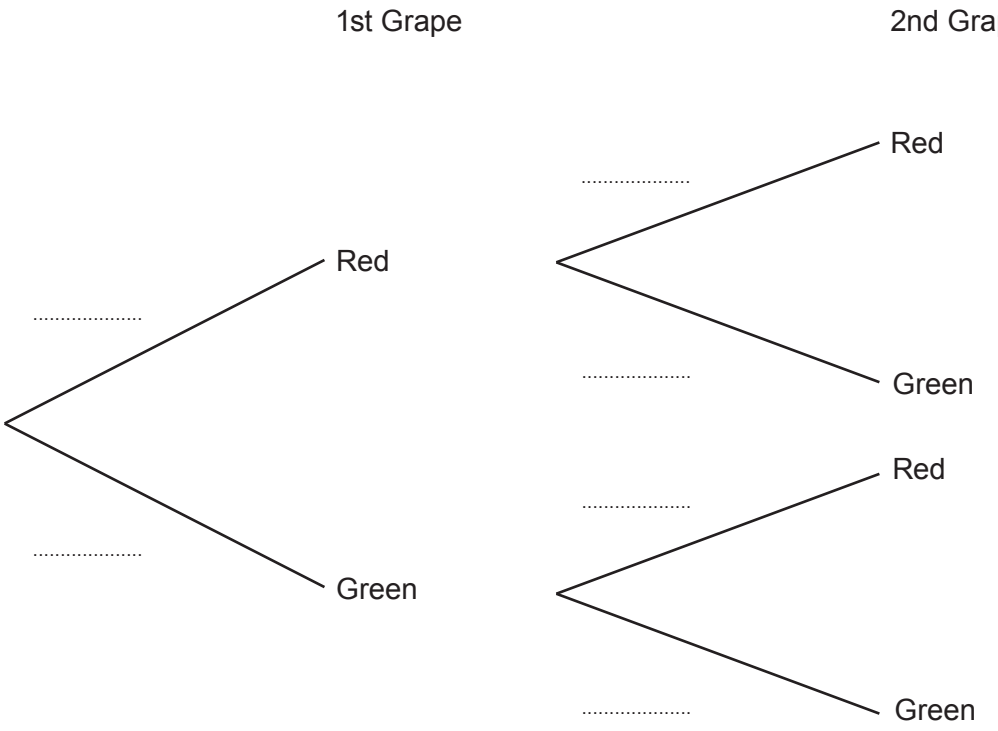
6. Vera has a pot containing 4 red grapes and 6 green grapes.
She takes a grape at random and eats it.
She then takes another grape at random and eats it.

(a) Complete the probability tree to show this information. [3]



(b) Work out the probability that the second grape Vera eats is green. [3]

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7. *(a)* A 5-course banquet has 3 options for each course.
The number of possible 5-course meals is m.

Find the value of m. [2]

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m = ...

(b) The caterer for the banquet decides to change the menu so that there are only 2 options for the first course. The options for the other courses remain the same.

The number of possible 5-course meals is now pm.

Find the value of p. [2]

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p = ...

8. *(a)* Write $\sqrt{44}+\sqrt{275}$ in the form $k\sqrt{11}$, where k is an integer. [2]

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(b) Show that $\dfrac{\left(\sqrt{3}-1\right)^2}{\sqrt{3}}$ can be written as $c\sqrt{3}+d$, where c and d are values to be found. [3]

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(c) $2\sqrt{x} - \sqrt{y} = 0$

Find a value for x and a value for y so that $\sqrt{x}$ and $\sqrt{y}$ are surds. [2]

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x = ... y = ...