

Eastern Goldfields College

Year 11 Mathematics Essential U1 2019

Task 5 Test 3 – Calculator Assumed

Time allowed: 60 minutes

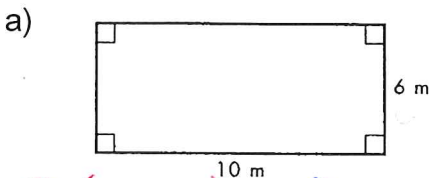
Task Weighting: 9%

Total Marks 55

One A4 page of notes permitted in this section.

Question 1 [3 Marks – 1,2]

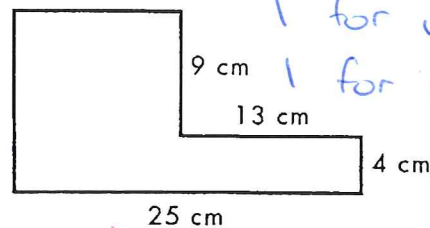
Calculate the perimeter of the following shapes



$$\begin{aligned}
 P &= (L + W) \times 2 \\
 &= (10 + 6) \times 2 \\
 &= 16 \times 2 \\
 &= 32 \text{ m}
 \end{aligned}$$

1 mark for correct answer

b)



$$\begin{aligned}
 P &= (L + W) \times 2 \\
 &= (25 + 13) \times 2 \\
 &= 38 \times 2 \\
 &= 76 \text{ cm}
 \end{aligned}$$

or other correct working

1 for working
1 for correct answer

Question 2 [1 Mark]

Farmer Jack wants to put a 1m high fence around the paddock for his sheep. If the area of the paddock is 24m^2 what could be the dimensions of the paddock?

Accept any variant that produces 24m^2

eg. $4\text{m} \times 6\text{m}$, $3\text{m} \times 8\text{m}$, $2\text{m} \times 12\text{m}$

Subtract $\frac{1}{2}$ mark if no (or incorrect) units are used.

Question 3 [3 Marks]

For a warm-up, Edmond runs one lap of his soccer pitch which is 120m long and 100m wide. Cody complains that his coach makes him run 4 laps of the basketball court, which is 30m long and 15m wide, when they train. Who runs further in their warm-up?

Edmond

$$\begin{aligned}
 P &= (L + W) \times 2 \\
 &= (120 + 100) \times 2 \\
 &= 220 \times 2 \\
 &= 440 \text{ m}
 \end{aligned}$$

1 mark for Edmond working + answer

Cody

$$\begin{aligned}
 P &= (L + W) \times 2 \\
 &= (30 + 15) \times 2 \\
 &= 45 \times 2 \\
 &= 90 \text{ m} \times 4 \text{ laps} \\
 &= 360 \text{ m}
 \end{aligned}$$

1 mark for Cody working and answer

Edmond runs further. - 1 mark for answer statement.

Question 4 [2 Marks]

Isobel wants to place skirting board around the floor in her bedroom and has 35m of skirting board leftover from another room. If her room is 8m long and 7.5m wide, will she need to buy any more skirting board and if so, how much?

$$\begin{aligned}
 P &= (L+W) \times 2 \\
 &= (8+7.5) \times 2 \\
 &= 15.5 \times 2 \\
 &= 31\text{m}
 \end{aligned}
 \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} \begin{array}{l} \text{1 for working} \\ \\ \text{No, she has enough} \\ \text{skirting board.} \end{array}$$

0.5 for answer statement

0.5 for correct perimeter, including units

Question 5 [8 Marks]

Complete the missing values to make the conversions true

- | | | | | | |
|---|---------------------------------|---------------|---|--|---------------|
| a | $20.68 \text{ cm}^2 = 0.002068$ | m^2 | e | $1.2 \text{ m}^2 = 200000$ | mm^2 |
| b | $6.23 \text{ kilograms} = 6230$ | grams | f | $5400 \text{ joules} = 5.4$ | kilojoules |
| c | $40 \text{ cm}^3 = 40000$ | mm^3 | g | $96 \text{ kJ} = 22.94 \text{ or } 23$ | calories |
| d | $70000 \text{ cm}^3 = 0.07$ | m^3 | h | $0.812 \text{ kW} = 812$ | Watts |

1 mark each

Question 6 [2 mark]

Ali has a jewellery box that is 50cm long and 30 cm wide. If the height of the box is 25cm, what is the volume of the box in cm^3 ?

$$\begin{aligned}
 V &= L \times W \times H \\
 &= 50 \times 30 \times 25 \\
 &= 37500 \text{ cm}^3
 \end{aligned}
 \left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} \text{1 for working} \\ \\ \text{1 for correct answer} \\ \text{must have correct units} \end{array}$$

Question 7 [2 mark]

A water tank is constructed in the shape of a cylinder. If the base of the water tank has an area of 25m^2 and stands 6m tall, calculate the amount of water that can fit in the tank. Give your answer in kL.

$$\begin{aligned}
 V &= \text{Area of base} \times \text{Height} \\
 &= 25\text{m}^2 \times 6 \\
 &= 150\text{m}^3 \\
 &= 150 \text{ kL}
 \end{aligned}
 \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} \begin{array}{l} \text{1 for working} \\ \\ \\ \text{1 for providing answer in kL} \end{array}$$

Question 8 [6 marks – 2, 4]

A supply plane contains crates which hold smaller packages in place. The large crate is a cube of side length 2.5m.

- a) Calculate the volume inside the crate

$$V = S^3$$

$$= 2.5^3$$

$$= 15.625 \text{ m}^3$$

1 for working
1 for correct answer (-0.5 if incorrect or no units used)

- b) On an upcoming mission the plane needs to deliver food packages to a small village. If each food package is a rectangular box 10cm wide, 25 cm long and 5cm high, how many smaller packages can fit into each large crate?

$$V = L \times W \times H$$

$$= 0.25 \times 0.1 \times 0.05$$

$$= 0.00125 \text{ m}^3$$

1 for working
1 for correct answer

$$15.625 \div 0.00125$$

$$= 12500 \text{ food packages will fit in the crate}$$

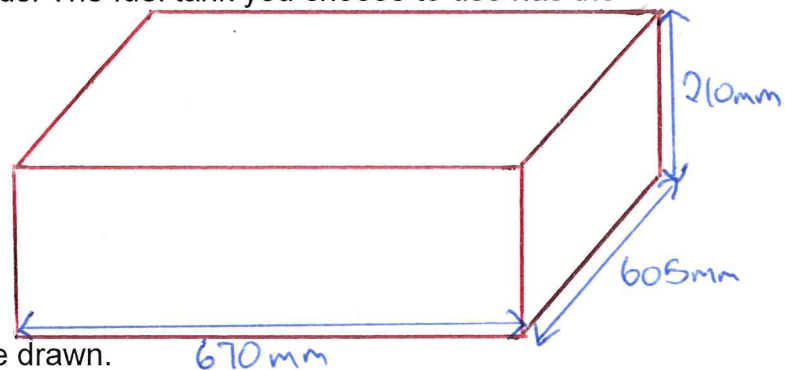
1 for working
1 for correct answer.

Question 9 [6 marks – 1, 1, 2, 2]

You are building a drag car with one of your friends. The fuel tank you choose to use has the dimensions of 670mm by 605mm by 210mm.

- (a) Draw the tank and label the dimensions.

Must be clearly drawn and correctly labelled for 1 mark.



- (b) Calculate the volume of the tank you have drawn.

$$V = L \times W \times H$$

$$= 670 \times 605 \times 210$$

$$= 85123500 \text{ mm}^3$$

1 mark for correct answer

- (c) Find the capacity of the tank to the nearest litre.

Number of ways of working but... $85123500 \text{ mm}^3 \div 10^3 = 85123.5 \text{ cm}^3$ 1 for working
 $(1 \text{ cm}^3 = 1 \text{ mL})$ 1 for correct answer
 $85123.5 \div 1000 = 85.1235 \text{ L}$

- (d) The actual capacity of fuel tanks can vary by as much as 3%. This means the tank has the ability to hold 3% more or less than its stated capacity.

Using your answer from part (c), calculate the maximum and the minimum capacity of the tank when there is a 3% variation.

$$0.03 \times 85.1235 = 2.55 \text{ litres}$$

$$85.1235 + 2.55 = 87.6735 \text{ L maximum capacity}$$

$$85.1235 - 2.55 = 82.5735 \text{ L minimum capacity}$$

1 for correct % calc
0.5 each for correct max or min calc

Question 10 [8 marks]

Complete the following table

Joule (J)	Kilojoule (kJ)	Calories
2000	2 kJ	478 Calories
1255 J	12.55 kJ	3
5160000 J	5160	1233 Calories
89200	89.2 kJ	21.3 Calories

1 mark per
correct
answer**Question 11** [3 marks]

An electrician has installed a powerpoint that can only power appliances that use less than 0.1 kilowatts of power per hour (kW/h). State whether the following appliances would be able to use this powerpoint:

- a) Lightbulb that uses 60 watts per hour (W/h) $60 \div 1000 = 0.06 \text{ kWh} - \text{Yes}$
 b) Microwave oven that uses 1500 W/h $1500 \div 1000 = 1.5 \text{ kWh} - \text{No}$
 c) 34cm colour TV that uses 55 W/h $55 \div 1000 = 0.055 \text{ kWh} - \text{Yes}$

1 mark per correct response - must
include working and Yes/No statement**Question 12** [5 marks – 2, 1, 2]

The formulae for Basic Metabolic Rate are below, giving the result in calories. The weight is measured in kilograms and the height measured in centimetres.

Female BMR (in calories) = $655 + (9.6 \times \text{weight}) + (1.8 \times \text{height}) - (4.7 \times \text{age})$

Male BMR (in calories) = $66 + (13.7 \times \text{weight}) + (5 \times \text{height}) - (6.8 \times \text{age})$

Calculate the BMR (in kilojoules) for the following people, showing all your working.

- a) A 17 year old male, 1.72m tall, weighing 58kg.

$$66 + (13.7 \times 58) + (5 \times 172) - (6.8 \times 17) = 1605 \text{ calories}$$

$$1605 \times 4.184 = 6715 \text{ kilojoules}$$

- b) A 54 year old male, 178cm tall, weighing 73kg.

$$66 + (13.7 \times 73) + (5 \times 178) - (6.8 \times 54) = 1588.9 \text{ calories} \quad (\text{accept } 1589)$$

$$1588.9 \times 4.184 = 6648 \text{ kilojoules}$$

- c) What happens to BMR as people get older? Explain what aspect of the formula causes this.

BMR slows down as we age. This is reflected in the last part of the formula where $(6.8 \times \text{Age})$ is subtracted.

Question 13 [6 marks – 1, 2, 3]

Anne has a clothes dryer that is rated at 2350 watts and is used for about half an hour each morning during summer.

a) Convert 2350 watts to kilowatts

$$2350 \div 1000 = 2.35 \text{ kW}$$

1 for correct answer

b) What is the total number of kilowatt hours used by the dryer in one week.

$$0.5 \times 7 = 3.5 \times 2.35 = 8.225 \text{ kWh}$$

1 for appropriate working

1 for correct answer

Anne is concerned about her electricity usage (consumption) during the winter. She decides to compare her electricity bill to her neighbour Bob, who has the exact same model of dryer. Both use their dryers for **1.5 hours** each day during winter. Anne puts hers on at **10 am** whilst Bob turns his on at **5pm**.

On-Peak Electricity Time = 2pm – 7pm charged at 49.3 cents per kWh.

Off-Peak Electricity Time = 9am – 12pm charged at 13.6 cents per kWh.

c) Use the information above and below to determine who is charged the least per week and whether or not Anne should be concerned about her electricity usage. Explain your answer with the support of a mathematical calculation.

Bob

$$1.5 \text{ hrs} \times 7 \text{ days} = 10.5 \text{ hrs} \times 2.35 \text{ kW} = 24.675 \text{ kWh} \times 49.3 \text{ c} = 1216 \text{ c or } \$12.16$$

Anne

$$24.675 \text{ kWh} \times 13.6 \text{ c} = 336 \text{ c or } \$3.36$$

(1 for Anne's correct working and correct answer)

Bob's dryer use costs him \$12.16 per week while Anne's use costs \$3.36. They both use the same amount of electricity but because Anne uses it at an off peak period she pays a lower tariff which costs less money.
(1 mark for appropriate response)