−1 rounding
−1 no units

Student Name SOLUTIONS

Eastern Goldfields College
Mathematics Essential Unit 3 2017

Test 2

Working Time: 25 minutes **Total Marks: 26 marks**

Calculator Free (No notes or calculator allowed)

Question 1 [2 marks]

For the following items state whether you would be required to calculate the length, area, surface area, volume or capacity.

a) The amount of metal in a steel ball bearing. volume ½

b) The amount of carpet needed to carpet a house. area ½

c) The amount of cordial that can fit into a particular jug? capacity ½

d) The distance around a race track. length ½

Question 2 [3 marks]

We want to determine the community's views on the reopening of the 10 pin bowling alley near the hockey stadium. As a student at EGC, you have been asked to determine the student's opinions on this issue. List three factors will you need to consider before collecting this information?

- How many students should be asked? ✓
- Who needs to be asked? (YR 11's/12's/8's?) ✓
- How will the data/opinions be collected? Survey? Questionnaire? ✓

other relevant factors

Question 3 [3 marks]

The purpose of sampling as a method of data collection, is to provide an estimate of population values or characteristics.

State one method of sampling, explain what it is and how it could be used to gather data.

random – equally likely – number participants & randomly choose ✓

stratified – proportion of each layer/group to rep. population ✓

cluster – group/suburb and survey all members ✓

systematic – number/order & choose every 5th, 10th etc.

plus others

Question 4 [5 marks]

Circle the correct answer in each of the following:

a) 2.15 km converts into how many metres?
(i) 21.5 m (ii) 215 m (iii) 2150 m (iv) 21500 m

b) 250 L converts to how many ml?
(i) 250 ml (ii) 2500 ml (iii) 0.25 ml (iv) 250000 ml

c) 1 m^2 converts to how many cm^2?
(i) 100 cm^2 (ii) 10 000 cm^2 (iii) 100 000 cm^2 (iv) none of these

d) 5.4 cm^2 converts to how many mm^2?
(i) 540 mm^2 (ii) 5400 mm^2 (iii) 54 mm^2 (iv) none of these

e) 15 m^3 has a capacity of how many Litres?
(i) 1500 ml (ii) 15 L (iii) 15 000 L (iv) 150 000 ml

Question 5 [5 marks]

Consider the following survey questions.

Question 1: How much homework do you do?
Question 2: Do you agree that passengers should wear a seat belt?
Question 3: Do you think Coles should open on Sundays in Kalgoorlie?

a) Which of the above questions are inappropriate survey questions? Explain why.

Q1 and Q2 are both inappropriate

Q1. 'Much' is not clear & over what time period is not stated.

Q2. 'Do you agree' is leading and suggests that it should be supported. ('Passengers of what?')

b) For each question you identified as inappropriate, correct it by rewriting the question.

1. How many hours of homework do you do each night?

2. Should passengers in buses/cars/planes etc wear a seat belt?

Question 6 [3 marks – 2, 1]

Bronty and Cassie planned to collect data on the number of hours that the 30 students in their Year 12 class spent watching TV on a weekday night.

a) Bronty created a table as shown at right and planned to ask each student which group they belonged to.

Time (hours)	Tally
0 - 1	
1 - 2	
2 or more	

Describe two advantages or disadvantages of her method.

✓✓

1 hr appears in 2 rows of table } disadvantages
2 or more is too large a category }
Data is organised in a table is an advantage

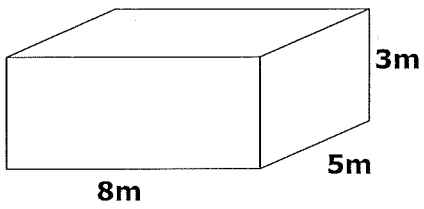
b) Cassie decided to ask each student and simply make a list of all their times.

Describe one advantage or disadvantage of her method.

lots of data, detailed data — advantages ✓
Time consuming, data would need to be collated

Question 7 [5 marks – 3, 2]

a) Calculate the surface area of the rectangular prism. Show all working.



SA = 2×8×5 + 2×3×5 + 2×8×3 ✓✓
= 80 + 30 + 48
= 158 m² ✓

b) Calculate the volume of the rectangular prism above. Show all working.

V = 8×5×3 ✓
= 120 m³ ✓

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Calculator Assumed **(Formulae sheet and one A4 page of notes)**

Question 8 [4 marks]

The school council has funds to either construct a basketball court or a tennis court. They wish to select a sample of 50 students from the school population to make a decision about which court to construct. The school has 150 year 8's, 190 yr 9's, 120 yr 10's, 90 yr 11's and 80 yr 12's. How many students from each year should the council select?

630 students ✓

YR 8 $\frac{150}{630} \times 50 = 11.9 \sim 12$ students

YR 9 $\frac{190}{630} \times 50 = 15.1 \sim 15$ students ✓✓ process

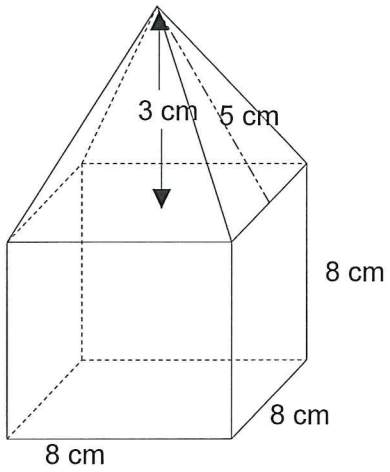
YR 10 $\frac{120}{630} \times 50 = 9.5 \sim 10$ students

YR 11 $\frac{90}{630} \times 50 = 7.1 \sim 7$ students ✓ appropriate rounding

YR 12 $\frac{80}{630} \times 50 = 6.3 \sim 6$ students

Question 9 [3 marks]

The figure below consists of a cube with a square pyramid placed on top.



The side length of the cube is 8 cm. The square pyramid has a height of 3 cm and a slant height of 5 cm.

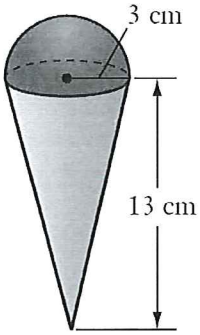
Determine the total volume of this figure.

$V = 8^3 + 8^2$ ✓ ✓

$= 576 \text{ cm}^3$ ✓ FT

Question 10 [5 marks – 3, 2]

A **choctop cone** is a favourite with movie-goers. The cone is full of ice-cream and has a scoop of ice-cream on top in the shape of a hemisphere which is covered in chocolate as shown below. (*Just the hemisphere has a chocolate coating)



a) What is the total volume of ice-cream? (Round answer to one decimal place)

122.5 56.55

$V = \frac{1}{3} \times \pi (3)^2 \times 13$ ✓ $+ \frac{2}{3} \pi (3)^3$ ✓

$= 179.1 \text{ cm}^3$ ✓ FT

−1 if not rounded to 1 dp

b) What surface area is covered with chocolate? (Round your answer to the nearest whole number)

$SA = 2\pi (3)^2$ ✓

$= 56.54 \sim 57 \text{ cm}^2$ ✓ FT

−1 if not rounded to whole no.

Question 11 [4 marks]

A gas company stores gas in spherical tanks.
The diameter of each spherical tank is 8.32 m to the nearest cm.

The volume of one tank has been calculated as 2412.45 m^3 using the formula below. One of their employees queries the volume obtained.

Is he justified? Explain and recalculate if necessary.

$$V = \frac{4}{3}\pi \times 8.32^3$$

$$= 2412.45 \text{ m}^3$$

Yes ✓ The calculation is not correct as the ✓ diameter rather than radius has been substituted.

should be: $V = 4/3\,\pi \times 4.16^3$ ✓

$= 301.6 \text{ m}^3$ ✓

Question 12 [4 marks – 3, 1]

Consider the solid prism of length 30 cm shown in figure 1. The prism has a square cross-section with a quarter of a circle removed from the top right corner, as shown in figure 2. The square has a side length of 8 cm and the radius of the circle is 4 cm.

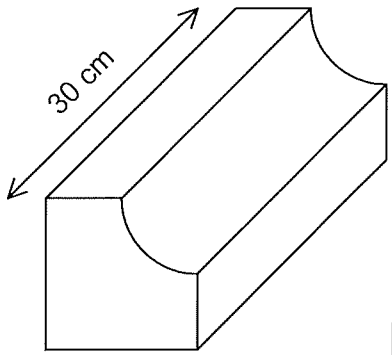


Figure 1

Not to scale

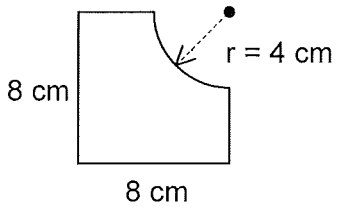


Figure 2

(a) Show that the area of the cross-section shown in Figure 2 is 51.43 cm^2, rounded to two decimal places.

Area of x Section $= 8^2 - \pi \times 4^2 \div 4$ ✓ ✓

$= 51.43$ ✓

(b) Calculate the volume of the solid prism shown in Figure 1.

$V = 51.43 \times 30$

$= 1543\ cm^3$ ✓ (accept $1542.9\ cm^3$)

END OF TEST