

ROSSMOYNE SHS SEMESTER 1, 2011  
UNIT 2A MATHEMATICS EXAMINATION

SECTION B APPROVED CALCULATORS PERMITTED

STUDENT'S NAME

Solutions

TEACHER:-

(Circle one name)

FLETCHER

TANDAY

TIME ALLOWED FOR THIS PAPER

Reading time before commencing Section B

Five minutes

Working time for Section B

Eighty minutes

Available marks:

Section A

40 marks

Section B

80 marks

Total

120 marks

**MATERIAL REQUIRED / RECOMMENDED FOR THIS PAPER**

TO BE PROVIDED BY THE SCHOOL:

This Question/Answer booklet

TO BE PROVIDED BY THE CANDIDATE

*Standard Items*

Pens, pencils, eraser, ruler

*Special items*

Curriculum Council Mathematical Formulae and Statistics Tables Book, drawing instruments, templates, notes on two sheets (4 sides) of A4 paper and calculators (Section B only) satisfying the conditions set by the Curriculum Council.

NOTE: Personal copies of the Tables Book should not contain any handwritten notes, symbols, signs, formulae or any other marks (including underlining and highlighting), except the name and address of the candidate, and may be inspected during the examination.

**IMPORTANT NOTE TO CANDIDATES**

No other items may be taken into the examination room.

It is your responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor BEFORE reading any further.

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80

## SECTION B

### APPROVED CALCULATORS PERMITTED FOR THIS SECTION

TIME: 80 minutes

MARKS ALLOCATED 80 marks

Question 1 [2 marks]

An employee is on a wage of \$650 per week.

What would be the new wage after a 4.5% increase?

$$\begin{array}{l} \$650 \times 1.045 = \$679.25 \\ \checkmark \qquad \qquad \qquad \checkmark \end{array}$$

Question 2 <sup>3</sup> [3 marks]

**After** a discount of 12.5% is given, a coffee machine is sold for \$367.50

What was the marked price **before** the discount was given?

$$\begin{array}{l} x \times (1 - 0.125) = 367.50 \\ x \times 0.875 = 367.50 \checkmark \\ x = \frac{367.50}{0.875} = \$420 \checkmark \\ \checkmark \qquad \qquad \qquad \checkmark \end{array}$$

Question 3 [3 marks]

The 65 students in the 2AMAT course represent approximately 17.5% of the Year 11 population.

How many students are there in Year 11 (give answer to nearest whole number)?

$$\begin{array}{l} \checkmark \frac{65}{x} = \frac{17.5}{100} \checkmark \\ x = 371 \checkmark \end{array}$$

Question 4 [3 marks]

The volume of a gas is **directly** proportional to its temperature in degrees Kelvin ( $^{\circ}\text{K}$ ).  
If a gas has a volume of 26 L at  $300^{\circ}\text{K}$ , find its volume at  $375^{\circ}\text{K}$ .

$$V = kT$$

$$\therefore k = \frac{V}{T} = \frac{26}{300} = 0.086$$

$$V = 0.086 \times 375 \text{ k}$$

$$V = 32.5 \text{ L}$$

Question 5 [3 marks]

The volume of a different gas is **inversely** proportional to the pressure applied to it. If the volume of a gas is 65L when a pressure of 1 450 kPa is applied, find the volume when a pressure of 900 kPa is applied.

$$V = \frac{k}{P}$$

$$k = VP = 65 \times 1450$$

$$V = \frac{94250}{900} = 104.72 \text{ L}$$

$$1450 \div 900$$

$$= 1.611$$

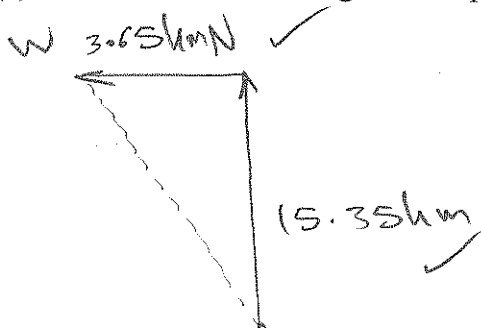
$$65 \times 1.61$$

$$= 104.7215$$

Question 6 [2, 3 = 5 marks]

A boat sails 15.35km due North, then changes direction to due West for 3.65 km.

(a) Draw a detailed diagram to represent this situation.



(b) Calculate the distance from its starting point.

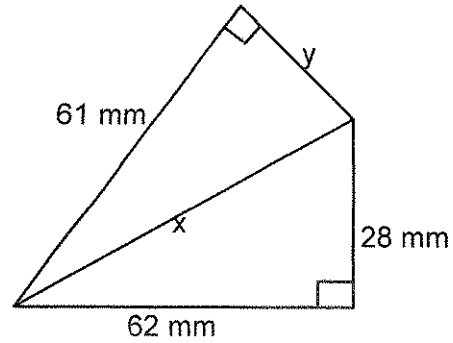
$$\text{Distance} = \sqrt{3.65^2 + 15.35^2}$$

$$\text{Distance} = 15.73 \text{ km (2dp)}$$

$\frac{1}{2}$  No units.

Question 7 [5 marks]

Calculate the lengths of the sides marked x and y in the diagram at right.



$$x = \sqrt{62^2 + 28^2}$$

$$x = 68.03 \text{ mm (2dp)}$$

68 ok

$$y = \sqrt{68.03^2 - 61^2}$$

$$y = 30.12 \text{ mm (2dp)}$$

(Actual 30.1164407)

30 mm ok

Question 8 [2, 2 = 4 marks]

The figure at right is a rectangular prism. Calculate the lengths of:-

(a) AC



$$AC = \sqrt{14^2 + 9^2}$$

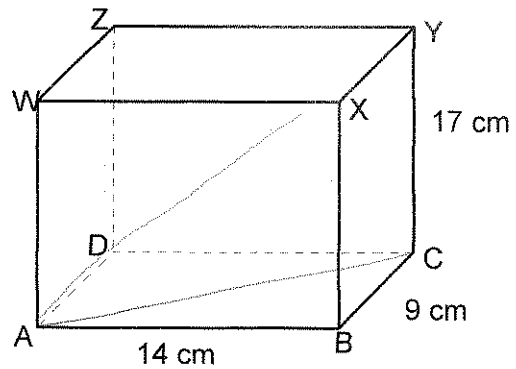
$$AC = 16.64331$$

(b) AY

$$AY = \sqrt{16.64331^2 + 17^2}$$

$$AY = 23.79 \text{ cm (2dp)}$$

(Actual 23.79075451)



Question 9 [2, 3 = 5 marks]

Give answers to this question to 2 decimal places for full marks

One of the equations of motion is

$$v = \frac{(2s)}{t} - u$$

(a) Find  $v$  if  $u = 7.8$ ,  $s = 10.75$  and  $t = 2.4$

$$v = \frac{2 \times 10.75}{2.4} - 7.8 \checkmark$$

$$v = 1.158\bar{3} \quad \therefore v = 1.16 \checkmark \text{ (2dp)}$$

(b) Find  $s$  if  $v = 11.23$ ,  $u = 27.48$  and  $t = 25.34$

$$11.23 = \frac{2 \times s}{25.34} - 27.48 \checkmark$$

$$\frac{25.34(11.23 + 27.48)}{2} = s \checkmark$$

$$s = 490.4557$$

$$s = 490.46 \checkmark$$

Question 10 [4 marks]

Which of the following boxes of Melloggs Crunchy Earwigs breakfast cereal is the best buy? Justify your answer (i.e. working **must** be shown).

Note: buying in bulk is not always the cheapest, or is it!!

A: 1.75 kg for \$12.10

B: 1.25 kg for \$8.65

C: 750 g for \$5.20

$$A \quad \frac{12.10}{1.75} = 6.914 \text{ \$/kg} \checkmark$$

$$B \quad \frac{8.65}{1.25} = 6.92 \text{ \$/kg} \checkmark$$

$$C \quad \frac{5.20}{.75} = 6.93 \text{ \$/kg} \checkmark$$

Best Buy A  $\checkmark$

or

$$A \quad \frac{1.75}{12.10} = 0.1446 \text{ kg/\$} \checkmark$$

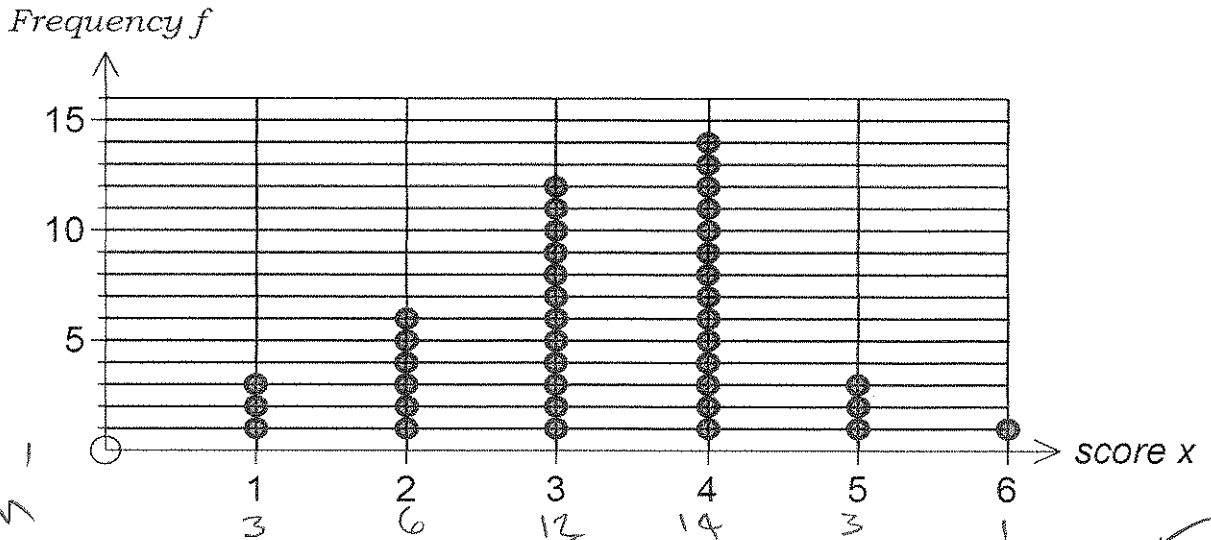
$$B \quad \frac{1.25}{8.65} = 0.1445 \text{ kg/\$} \checkmark$$

$$C \quad \frac{0.75}{5.20} = 0.1442 \text{ kg/\$} \checkmark$$

Best Buy A  $\checkmark$

Question 11 [6, 3, 3 = 12 marks]

a) Determine the mean, mode and median from the following dot frequency graph:-



MEAN

$$\bar{x} = \frac{(1 \times 3) + (2 \times 6) + (3 \times 12) + (4 \times 14) + (5 \times 3) + (6 \times 1)}{3 + 6 + 12 + 14 + 3 + 1} = \frac{128}{39}$$

$$\bar{x} = 3.28205 \quad \checkmark \text{ (correctly rounded.)}$$

Answers:	Mean = $3.28$ $\checkmark$ (3 marks)	Mode = $4$ $\checkmark$ (1 mark)	Median = $3$ $\checkmark$ (2 marks)
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(b) The eleven (11) girls in a class had a mean mark of 67.5%, and the ten (10) boys had a mean mark of 59.5%.

What was the mean mark for the whole class?

$$\bar{x}_g = \frac{\sum x_g}{n_g} \therefore 67.5 = \frac{\sum x_g}{11} \Rightarrow \sum x_g = 742.5$$

$$\bar{x}_b = \frac{\sum x_b}{n_b} \quad 59.5 = \frac{\sum x_b}{10} \Rightarrow \sum x_b = 595$$

$$\sum x_{b+g} = 1337.5 \quad \bar{x}_{g+b} = \frac{1337.5}{11+10} = 63.69 \quad \checkmark$$

(c) The following table shows the ages of people at a picnic spot.

Age	0-9	10-19	20-29	30-39	40-49	50-59
Number of people	20	9	8	14	7	2

Calculate the approximate mean age of the people at the picnic spot.

$$\bar{x} = 22 \quad \left( \frac{1320}{60} \quad \frac{\sum x}{n} \right)$$

... 5 used for mid of class

$\bar{x} = 26.5$  if upper limit used

2 marks only

Question 16 [3, 3 = 7 marks]

Subject	Biology	English	History	Phys Ed	Art	Maths 2A
Mark (%)	64	60	68	72	58	

In the Semester 1 Exams, Kylie scored the above marks. Her mark for Maths 2A is missing, but her mean mark over all six subjects was 68%.

(a) What was her mark for Maths 2A?

$$\frac{64 + 60 + 68 + 72 + 58 + x}{6} = 68$$

$$x = 408 - 322 = 86\%$$

(b) What was her median mark?

58, 60, 64, 68, 72, 86

median.  $\frac{64 + 68}{2} = 66\%$

(c) Bruce's marks for the same six subjects were, in ascending order, 42%, x%, 66%, y%, 73%, z%

His range of marks was 43%, his modal mark was 66%, and his median mark was 69%.

Find x, y and z

$$z\% = 43 + 42 = 85\%$$

$$x\% = 66\%$$

$$\frac{y + 66}{2} = 69$$

$$y = 72\%$$

Answers  $x = 66\%$   $y = 72\%$   $z = 85\%$

END OF SECTION B  
GO BACK AND CHECK ALL QUESTIONS ANSWERED, CHECK WORKING

Question 14 [3, 3 = 6 marks]

A wholesaler makes a profit of 15% when he sells an article to a retailer. The retailer makes a profit of 10% when he sells it to a customer. If the retailer sells an article to a customer for \$1524.36, find

- (a) the cost price to the retailer (to the nearest cent)

$$x \times 1.10 = 1524.36 \quad \checkmark$$

$$x = \frac{1524.36}{1.10} = 1385.781 \quad \checkmark$$

$$x = \$1385.78 \quad \checkmark$$

*Do not use rounded retailers price for working out the wholesalers price.*

- (b) the cost price to the wholesaler (to the nearest cent)

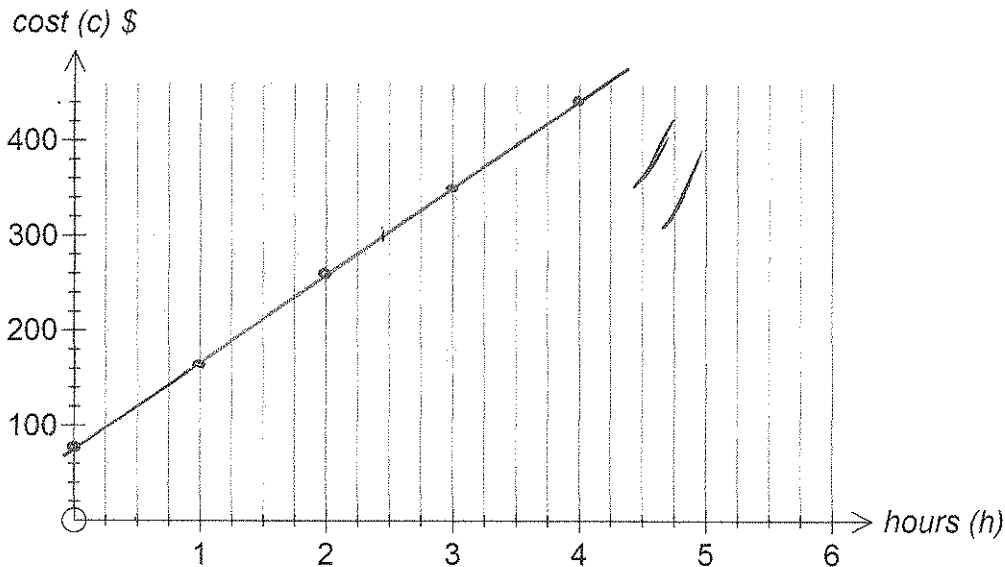
$$x \times 1.15 = 1385.781 \quad \checkmark$$

$$x = \frac{1385.781}{1.15} = \$1205.03 \quad \checkmark$$

Question 15 [2, 2, 2, 2 = 8 marks]

A mobile mechanic has a call-out fee of \$80 plus a charge of \$45 per halfhour.

- (a) Graph this relationship on the axes below



- (b) If  $h$  is the number of hours worked and  $c$  is the total cost (in \$), write down an expression for  $c$  in terms of  $h$ .

$$c = 90h + 80$$

- (c) Find  $c$  if  $h = 4$

$$c = \$440$$

- (d) Find  $h$  if  $c = \$300$

$$c = \$300$$

$$h = 2\frac{1}{2} \text{ hrs}$$

$$h = 2 \text{ hrs } 24 \text{ min}$$

2.4 Actual

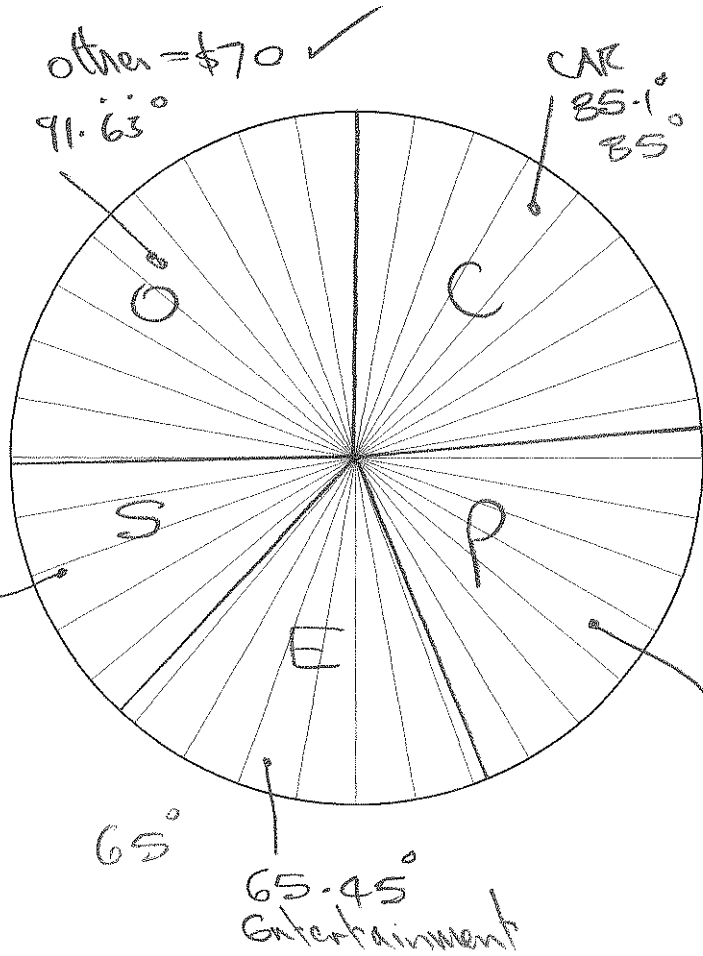


Question 12 [6 marks]

After paying his board, an apprentice has \$275 per week left of his wages. He spends \$65 per week on payments for his car, \$55 per week on petrol, \$50 per week on entertainment, \$35 per week is set aside for savings, and the rest is spent on **other** items.

Show where his money goes each week by **drawing a pie chart** (circle graph) to show how the \$275 is spent. (Divisions below are every 10°)

$$\begin{array}{r} 65 \\ 55 \\ 50 \\ + 35 \\ \hline 205 \\ 21 \end{array}$$



What angle of the graph represents **Other** items? 92

$\frac{70}{275} \times 360$  91.63 Deg

Give answer as a recurring decimal. /

Question 13 [3 marks]

A salesman is paid a retainer of \$625 per week, plus a commission of 6.5% on all sales for that week. One week, he was paid \$1090.00. What were his total sales for that week?

$$\$625 + 0.065 \times x = 1090.00$$

$$x = \frac{(1090.00 - 625)}{0.065}$$

$$x = \frac{465}{0.065}$$

$$x = 7153.85 \quad \checkmark$$