Mathematics Essentials 2017
Unit 3/4 Test 4
Task Weighting: 8%

EGC
Eastern Goldfields College

SOLUTIONS

Student Name: _____   TOTAL 57 Marks
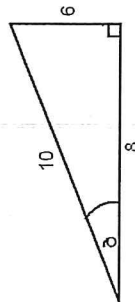
Time Allowed: 10 Minutes

<u>Calculator Free</u>   No calculator or notes permitted for this section.

Marks: 14

Question 1   (2 marks: 1, 1)

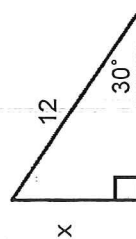Circle the correct answer in each of the following multiple choice questions

a) In relation to the angle, which is the opposite side?

(i) 10   (ii) 8   (iii) 6 ✓   (iv) none of these

b) The value for x in the diagram is given by:

(i) 12 x sin 30° ✓   (ii) 12 x cos 30°   (iii) $\frac{12}{\tan 30^\circ}$ (iv) $\frac{12}{\sin 30^\circ}$

Question 2   (2 Marks)

Express the probability of the following situation using the appropriate method shown:

Choosing a blue jellybean from a jar containing 7 red, 5 green and 4 blue jellybeans

I.   Word _____ unlikely ✓
II. Fraction _____ 4/16 or 1/4 ✓   ½ each.
III. Decimal _____ 0.25 ✓
IV. Percentage _____ 25% ✓

Measurement/procedure of likelihood of cure/success etc.

Question 3   (2 Marks)

Provide a real life example/situation where probability is used to make a decision or decisions.
Explain your answer

Weather, probability of rain is 10%. (outfit to wear)
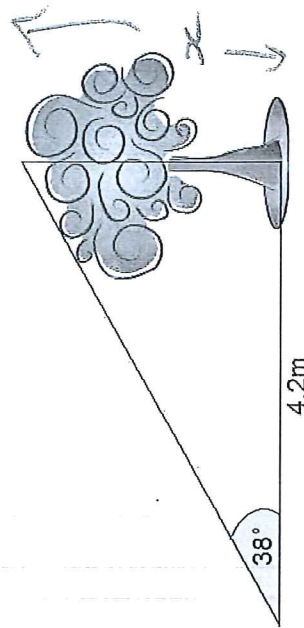Lotto, probability of winning is very small (change tickets)

Question 4   (1 Marks)

Mines Rovers Colts have won 3 of their 12 games (as of round 15). What is their relative frequency of winning?

3/12 or 1/4 or 0.25 or 25% ✓

Question 5   (3 Marks)

Explain how you would determine the height of the tree using the information provided.

Choose Tan ← write equ
↑ rearrange correctly

I would you trig ratio of Tan ✓

Tan 38° = x/4.2 ← State ✓

4.2 x Tan 38 = x ← rearrange ✓

or putting into an explanation

Calculator Assumed - Calculators and files are allowed in this test. *Show all working to maximise marks.*

Question 8 (3 marks)

A ladder 12 m long leans against a wall. If it forms an angle of 40^0 with the ground, how far is the bottom of the ladder away from the wall?

$$\cos 40 = \frac{x}{12}$$

$$12 \times \cos 40 = x$$

$$x = 9.2 \text{ m}$$
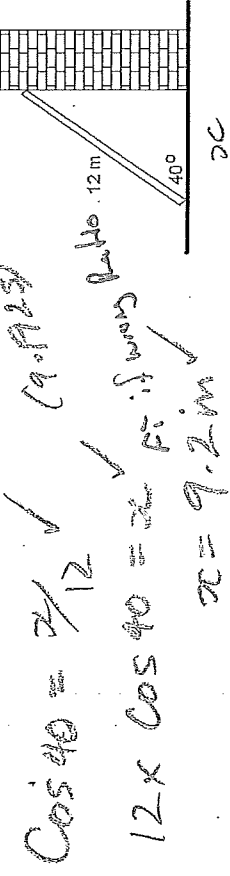
Question 9 (5 Marks)

Brodie **ALWAYS** orders from the following items when he eats at McDonalds; a Big Mac or a Quarter Pounder to start, then either a Chocolate, Caramel or Strawberry Mega Choc Waffle Cone and finally either a Coke or Fanta to wash it down.

If Brodie goes to McDonalds twice a week for 3 weeks how many Chocolate Mega Choc Waffle Cones would you expect Brodie to eat? Justify by demonstrating the sample space.

Allow a List.

6 times

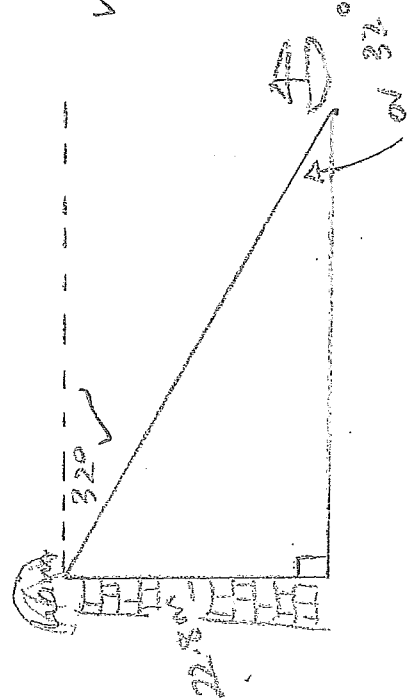$$\therefore 6 \times \frac{1}{3} = 2 \text{ choc MCWC}$$

Question 6 (2 Marks)

Tomorrow's weather forecast includes the statements: The probability of strong winds is 70%.
The chance of rain is $\frac{4}{5}$. Which event, strong winds or rain is more likely to occur? Justify with calculations.

80%   Rain as 80% > 70%.

Justification

Question 7 (2 Marks)

Sketch and label the following scenario:

Liam is standing at the top of a lighthouse that is 22.8m tall. He looks down at a boat at an angle of depression of 32°

End of Calculator Free Section

Question 10 (7 Marks: 2, 1, 1, 3)

In basketball a player can shoot one of 3 shots; a 2 pointer (worth 2 points), a 3 pointer (worth 3 points) or a Free Throw (worth 1 point). A player's shooting percentage is the probability of making that shot.

If Maui has a 2-Point field goal percentage of 46%, a 3-Point field goal percentage of 30% and a Free Throw percentage of 80%. Calculate:

a) How many Free Throws would you expect to be successful from 56 shots?

56×0.8

$= 44.8 \checkmark \sim 45 \checkmark$

b) How many 2-Pointers would you expect to be successful from 21 shots?

21×0.46

$= 9.66 \sim 10 \checkmark$

9.66 $=\checkmark$

c) How many 3-Pointers would you expect to be successful if 15 were shot?

15×0.3

$= 4.5 \sim 5 \checkmark$

4.5

d) Dion rates himself as a 3-point shooter (3-Point field goal percentage of 35%) but Maui thinks differently. Maui challenges Dion to a shootout and says that with 20 shots he could outscore Dion by shooting only 2 pointers, with Dion only shooting 3 pointers. Is he correct? Justify with calculations
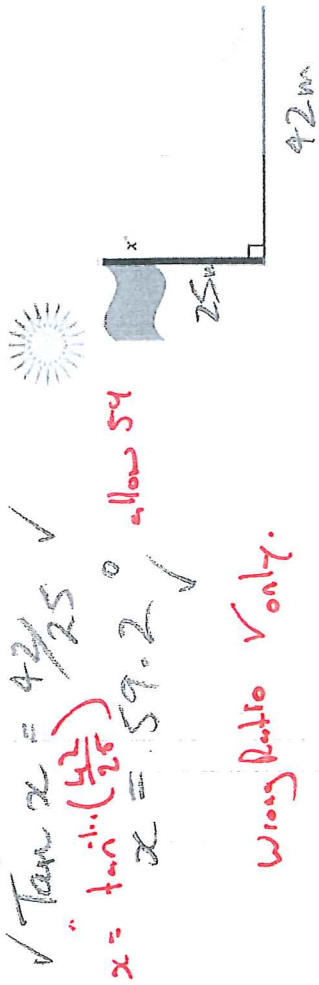
SHOTS   PTS

(2pts) $20 \times 0.46 = 9.2 \checkmark$ $9 \times 2 = 18 \checkmark$ / Maui

(3pts) $20 \times 0.35 = 7$ $7 \times 3 = 21$ / Dion

MAUI is not correct as he only scored
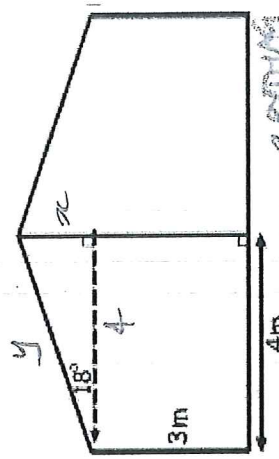
18 pts   whereas Dion got 21

Question 11 (3 marks)

A 25 m flagpole casts a 42 m shadow. What is the angle the sun makes with the flagpole that shot.

$\checkmark$ $\tan x = 42/25 \checkmark$

$\therefore x = \tan^{-1}\left(\frac{42}{25}\right)$ allow 59

$x = 59.2° \checkmark$

Wrong Ratio **\/only.**

25m

42m

x

Question 12 (4 marks)

Below is the metal cross section for a frame of a shed. If the metal costs $14.65/m, how much would it cost to construct this part of the frame?

y

x

4

18°

4m

3m

$\tan 18 = x/4$

$4 \times \tan 18 = x$

$x = 1.3$

$\cos 18 = 4/y$ or Pythag

$y = 4/\cos 18$

$y = 4.2 \checkmark$

$y = 4.2$

$+ 4.2$

Allow: $= 26.7$ m   too harsh

$4 + 3 + 4.2 + 4.3 + 4 + 3$
$(3 + 1.3)$

Allow: 26.7 m $\rightarrow$ Total metal is

$= 26.7$ m

Cost $= 26.7 \times 14.65 = \$391.55$

$27 \times 14.65 = \$395.55$

$\$391.16$

Question 13 (10 Marks 1, 2, 3, 2, 2)

Supposing that Ebola has a 70% fatality rate for those infected.

a) If there are 20 people in a hospital currently being treated for Ebola, how many of those people would you expect to die?

$$20 \times 0.7 = 14 \checkmark$$

b) In an African village that has 15 people infected with the virus, how many of those people expected to survive?

$$15 \times 0.3 = 4.5 \approx 5 \quad (15 \times 0.7 = 11) \quad (10.5)$$
$$15 - 11 = 4 \quad 0.5$$

You are studying the 20 people in hospital with the virus and want to conduct a simulation to determine what will happen to them.

c) Describe in detail how you could set up a simulation. For each person, how will you determine whether or not they die?

Assign nos 0 – 6 as prob. they die. ✓ true
u " 7 - 9 " " " " live ✓ true

Not each person + Generate no for them.
i.e nos 1st no. generated 2nd and 3 for that one.
At least so/so it will get close to the true real prob. (TRUE) ✓

d) How many trials of the simulation would you run? Explain your reasons.

e) Does this simulation guarantee to give you an accurate picture of what will happen? Explain.

✓ *No as villages other factors would be*
considered eg vaccinations, education,
sanitation etc. ✓

Question 14 (7 Marks: 2, 2, 2, 1)

This game is based on tennis but uses a coin and a six-sided die. There are two players, A and B. A serves by tossing a coin. If the outcome is heads (H) the service is good; if tails (T) there is a fault and that player is allowed to serve again. Only two services are allowed. H or TH gives a good service; TT gives a double fault, and B wins the point.

If the service is good, B rolls the die.

If the outcome is 1, 2, 3, or 4 then it is a good stroke; if 5 or 6 then the point is lost.

If the stroke is good then A rolls the die. This continues until the point is lost.

Pete is playing Mark in a game of Rainy Day Tennis.

a) Pete is serving. He tosses the coin and gets a head. He then tosses the coin again and gets another head. Mark says that Pete is playing the game incorrectly. Explain why.

Head means serve is good so no need to
toss coin again ✓

b) The following results of tossing the coin and rolling the die were recorded for a game:

P P P P P
T H 3 1 4 2 6

Explain who won, given that Pete served. Explain your answer

Pete won as Mark rolled the final
6 which meant the point was lost. ✓

c) If neither player had a coin, but they had the die, explain a method that could be used to play the game so that it is basically the same as in the rules.

1, 2, 3 could be good serve
4, 5, 6 " " fault ✓
or others.

d) State one factor that may cause this simulation to no longer model the real world event.

Fitness of players, court surface, weather,
injuries etc. ✓

Question 15 (4 marks)

"Odds On" is a game in which you set a dare and then each player picks a number from 1 to an agreed upon maximum number. The person has to complete the dare if either, both players say the same number, or if both numbers add up to the maximum number.

If you were challenged to do a dare with the maximum number being 3, what number should you pick to minimise the chances of you having to do the dare? Use the grid provided and justify your answer

PLAYER 1

	1	2	3
1	LOSE/DARE	LOSE/DARE	OK
2	LOSE/DARE	LOSE/DARE	OK
3	OK	OK	LOSE/DARE

NO. 3 ✓ as the other numbers he
has 2 chances of losing whereas
3 he only has ⅓ (If his friend also picks #)

OF SIMILAR EXPLANATION using probabilities ✓

1 & 2 are involved in 4 of the 5
lose possibilities whereas 3 is only
involved in 1

End of Test

½
½
P1 + P2 = 1, 2, 3
Fill out table ✓

Player 1 is set
the dare

[Allow number in grid.]
Fol

(If his friend also picks #)

Follow though from Grid.