

NAME:

TEACHER:



Christ's College
Mathematics Department

Year 10

PRACTICE End of Year Examination (3)

Time: 90 minutes

Algebra	40 marks	<input type="text"/>
Graphs	20 marks	<input type="text"/>
Measurement	20 marks	<input type="text"/>
Number	25 marks	<input type="text"/>
Trigonometry	20 marks	<input type="text"/>
Geometry	20 marks	<input type="text"/>
Probability	15 marks	<input type="text"/>
	Total Marks/160	<input type="text"/>

Answer ALL questions in the spaces provided in this booklet.

Show ALL necessary working.

Algebra (40 marks)

QUESTION ONE

(a) Simplify $10p + 3w - 8p - 5w$

_____ [1]

(b) Simplify $2w^4 \times 3w^7$

_____ [1]

(c) Simplify $\frac{4}{a} + \frac{5}{a}$

_____ [1]

(d) Simplify $\frac{x^4 \times x^5}{x^3}$

_____ [1]

(e) Expand $2p(5p - 3)$

_____ [1]

(f) Expand $-2x(6 - x)$

_____ [1]

(g) Expand $a(b + 2)$

_____ [1]

(h) Factorise $12k^2 + 8k$

_____ [1]

(i) Factorise $y^3 - y$

_____ [2]

(j) The area of a circle is given by $A = \pi r^2$.

Find the area of a circle with a radius of 12 cm.

_____ [1]

QUESTION TWO

Solve the following equations:

(a) $6k + 8 = 11$

_____ [1]

(b) $\frac{p}{5} + 7 = 11$

_____ [1]

(c) $10k + 5k = 300$

_____ [1]

(d) $3 - 4(z - 1) = 11$

_____ [2]

(e) $\frac{2 + 4m}{-3} = 5$

_____ [2]

QUESTION THREE

(a) Simplify $\left(\frac{p^2}{w^3}\right)^4$

_____ [1]

(b) Expand $(x + 7)(x - 3)$

_____ [2]

(c) Factorise $x^2 - x - 20$

_____ [2]

(d) Factorise $x^2 - 49$

_____ [1]

(d) The area of a triangle is given by:

$$A = \frac{bh}{2}$$

Rewrite this, making h the subject of the formula.

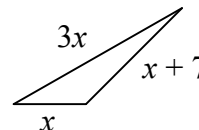
_____ [1]

QUESTION FOUR

(a) Solve $12x - 8 = 10x + 21$

_____ [2]

(b) The perimeter of the triangle is 37 cm.



Form an equation and solve to find the length of the shortest side.

_____ [3]

(c) Solve $\frac{x + 2}{3} = \frac{x - 5}{4}$.

_____ [3]

(d) Solve $\frac{x - 1}{-3} - 2x = 12$.

_____ [3]

QUESTION FIVE

Hayden and Tayla have four children:
Elizabeth, Mike, Sam and Catherine.

Catherine is one half of Sam's age.

Elizabeth is one third of Mike's age.

Sam and Mike's ages add to 37.

Elizabeth and Catherine's ages add to 15.

Form at least one equation and solve to
find the ages of all four children.

[4]

Graphs (20 marks)

QUESTION ONE

(a) Give the next two terms of each sequence:

(i) 20, 14, 8, _____, _____ [1]

(ii) 4, 5, 8, 13, 20, _____, _____ [1]

(iii) \top , \neg , \perp , _____, _____ [1]

(b) Which of the following rules generates the pattern: 5, 8, 13, 20, ...

- A. $3n + 6$ B. $n^2 + 4$
- C. $(n + 3)^2$ D. $5n$

_____ [1]

(c) Given the pattern:

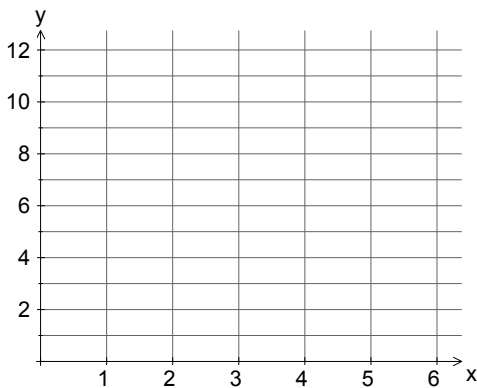
n	T
1	10
2	13
3	16
4	19

Write the rule for T in terms of n .

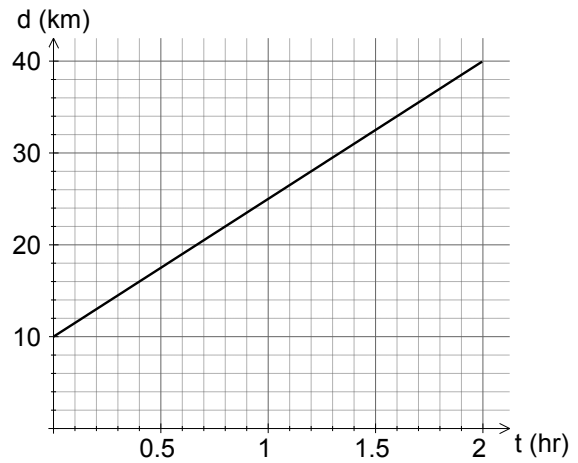
$T =$ _____ [1]

QUESTION TWO

(a) Plot the relation: $y = 10 - 2x$ on the graph below [1]



(b) Michelle goes for a bike ride from work. She records how far she is from home.



On the graph, find

(i) the d -intercept _____ [1]

(ii) the gradient. _____ [1]

QUESTION THREE

The rule for a pattern is given by:

$T = 100 - 4n$, n is a natural number.

(a) Find the first four terms.

_____ [1]

(b) Find T when $n = 40$.

_____ [1]

(c) Find n when $T = 0$.

_____ [1]

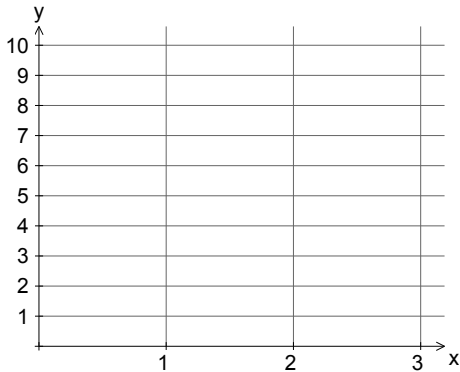
QUESTION FOUR

Given the relation: $y = 2x + 3$

(a) (i) What is the y -intercept? _____ [1]

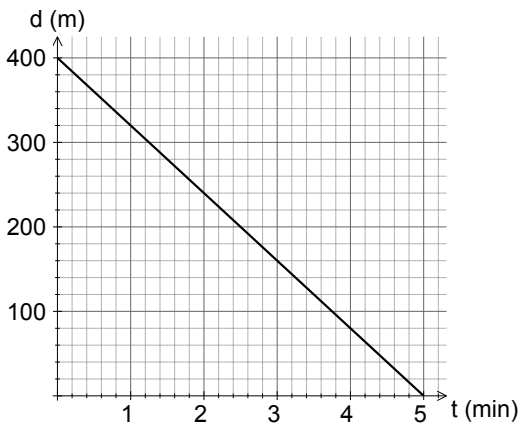
(ii) What is the gradient? _____ [1]

(b) Draw the graph of $y = 2x + 3$. [1]



QUESTION FIVE

Debbie is walking home from work. The graph shows her distance from home on her trip home.



(a) Write **statements** that **interpret** the following features of the graph:

(i) the d -intercept
_____ [1]

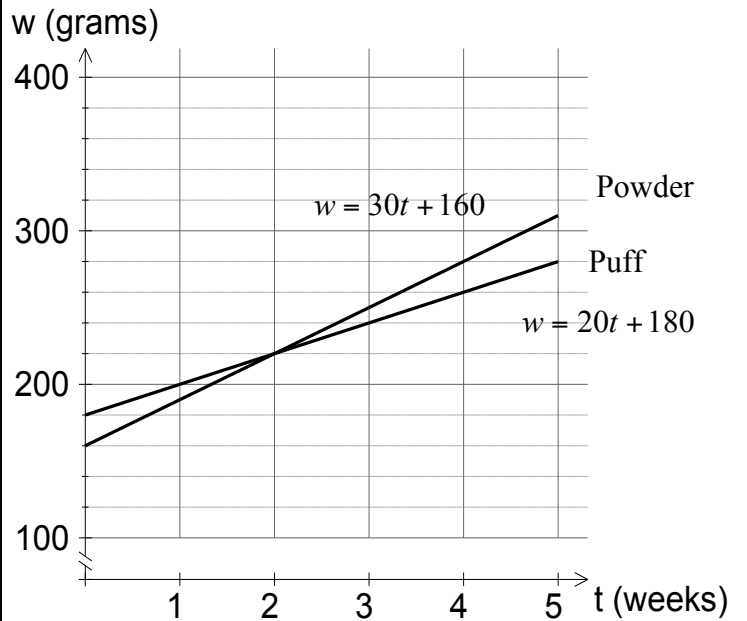
(ii) the t -intercept
_____ [1]

(iii) the gradient.
_____ [1]

(b) Write the equation for the graph.
_____ [1]

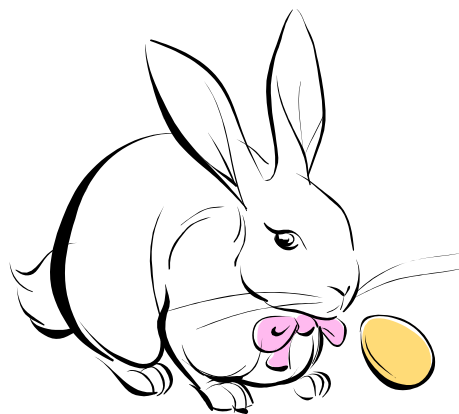
QUESTION SIX

The graph shows the weights for two cute fluffy white rabbits (Powder and Puff) that grow at a constant rate.



(a) Which rabbit is growing the fastest?
_____ [1]

(b) After how many weeks are the rabbits the same weight?
_____ [1]



Measurement (20 marks)

Useful Formulae

Circumference of Circle: $C = \pi D$

Area of parallelogram: $A = bh$

Area of triangle $A = \frac{1}{2}bh$

Area of Circle: $A = \pi r^2$

Area of trapezium: $A = \frac{1}{2}(a + b)h$

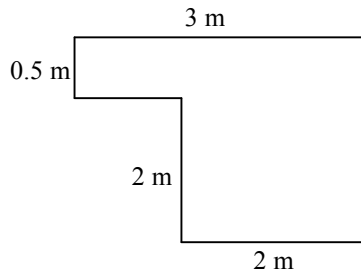
Volume Prism = *base area* \times *height*

Volume Pyramid = $\frac{1}{3} \times$ *base area* \times *height*

Volume Sphere = $\frac{4}{3} \pi r^3$

QUESTION ONE

Carissa's dad built her a doll's house. A plan of its floor is shown below.



(a) Calculate the perimeter of the floor.

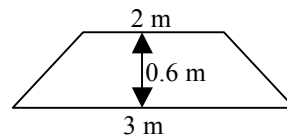
_____ [1]

(b) Calculate the area of the floor.

_____ [2]

QUESTION TWO

The shape of the end of the roof of the doll's house is a trapezium.



Calculate the area of the end of the roof.

_____ [2]

QUESTION THREE

Carissa started playing in her doll's house at 1130 hours and played for an hour and three-quarters. What time did she finish playing in the doll's house?

_____ [1]

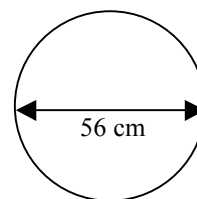
QUESTION FOUR

It takes Carissa's mum 5 hours 30 minutes to drive 440 km to her parents home. Calculate her average speed.

_____ [1]

QUESTION FIVE

Carissa has a round window in her doll's house.



(a) Calculate the perimeter of the window.

_____ [1]

(b) Calculate the area of the window.

_____ [2]

(c) The plastic in the window is 0.6 cm thick. Calculate the capacity of the plastic in the window in litres.

_____ [2]

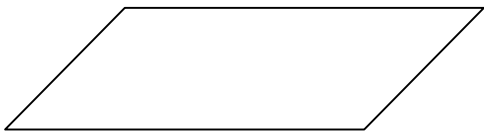
QUESTION SIX

Carissa's dad goes for a 120 km bike ride.
His average speed was 36 kph.
How long did it take him? Give your
answer in hours and minutes.

[2]

QUESTION SEVEN

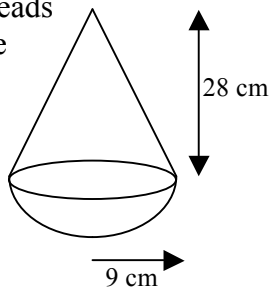
Take appropriate measurements and calculate
the area of the parallelogram below.



[2]

QUESTION EIGHT

Carissa makes clown heads
that have a hemi-sphere
under a cone.



She fills the clown head with polystyrene
balls. Each bag holds 1.5 litres of balls.
How many bags are needed?

[4]

Number (25marks)

QUESTION ONE

- (a) (i) Convert the number 5260000 into standard form.
_____ [1]
- (ii) Round the number 23841 to 3 significant figures.
_____ [1]
- (iii) Round the number 5.7354 to 2 decimal places.
_____ [1]
- (b) 18 out of 30 students in Juliet's English class are boys. What percentage of the students in her English class are boys?
_____ [1]
- (c) There are 28 students in Juliet's PE class. 43% of the students are boys. How many students in her PE class are boys?
_____ [1]
- (d) At the start of the year Rob, a Y9 boy, was 1.62 m tall. During the year his height increased by 5%. How tall was Rob at the end of the year?

_____ [1]
- (e) In Juliet's Maths class there are 2 boys to every 3 girls. If there are 25 students in her Maths class, how many are girls?

_____ [1]

QUESTION TWO

- (a) At the start of the year Suzanne, a Y9 girl was 1.58 m tall. By the end of the year she was 1.64 m tall. Calculate her percentage increase in height during the year.

_____ [2]
- (b) The ratio of boys to girls in Juliet's Science class is 3:4. If there are 12 boys in this class, how many girls are there?

_____ [2]
- (c) In Juliet's Art class $\frac{2}{3}$ are European and $\frac{1}{6}$ are of Asian origin. What fraction of the class is neither European nor Asian?

_____ [2]
- (d) Juliet bought some coloured paper for her English class to make some posters. It was in a 15% off sale. If the full price was \$24, what was the sale price?

_____ [2]
- (e) Evaluate $\sqrt{4^4 + 12^2}$.

_____ [2]

Trigonometry (20 marks)

QUESTION ONE

(a) Evaluate, accurate to 3 decimal places:

(i) $\sin 73^\circ = \underline{\hspace{2cm}}$ [1]

(ii) $\cos 15^\circ = \underline{\hspace{2cm}}$ [1]

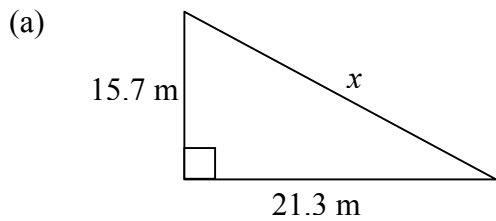
(b) Find angle x , accurate to 1 decimal place:

(i) $\cos x = 0.5 = \underline{\hspace{2cm}}$ [1]

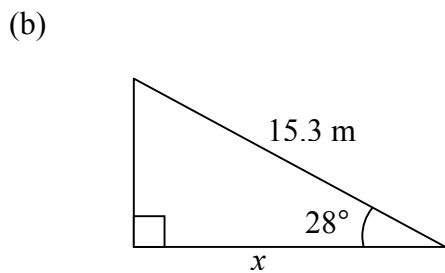
(ii) $\tan x = 0.5 = \underline{\hspace{2cm}}$ [1]

QUESTION TWO

Find x , the unknown length, to 1 dp:

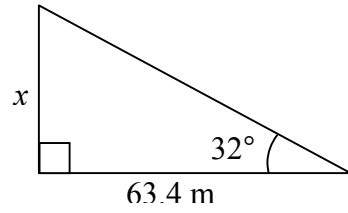


_____ [2]



_____ [2]

(c)

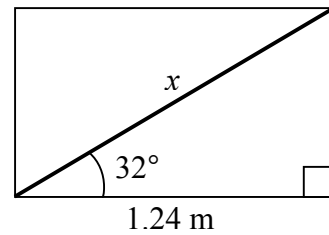


_____ [2]

QUESTION THREE

Conrad is making rectangular gates that have one diagonal brace for extra strength.

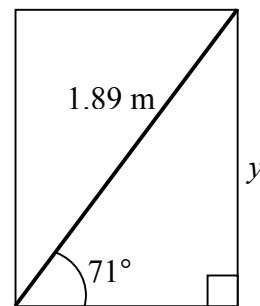
(a) Conrad's first gate is shown below:



Find x , the length of the diagonal brace.

_____ [2]

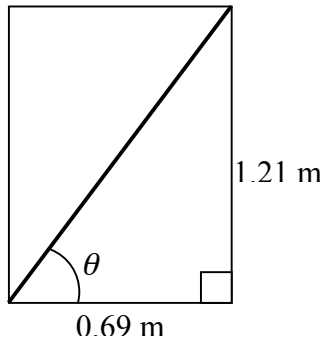
(b) Conrad's second gate is shown below:



Find y , the height of the gate.

_____ [2]

(c) Conrad's third gate is shown below:



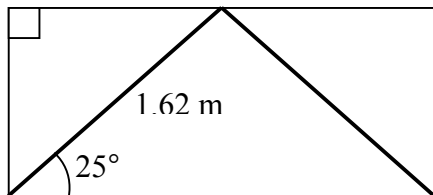
Find θ , the angle of the diagonal brace to the base of the gate.

[2]

QUESTION FOUR

Conrad also makes a symmetrical gate that requires two braces meeting at the middle of the top of the gate.

Each brace is 1.62 metres long.



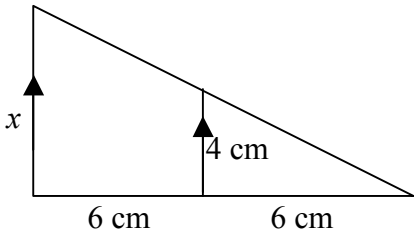
Calculate the dimensions (the lengths of each side) of the gate.

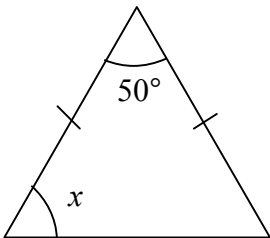
[4]

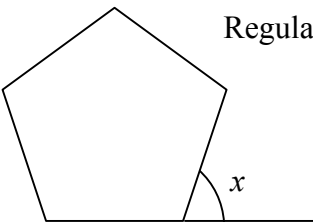
Geometry (20 marks)

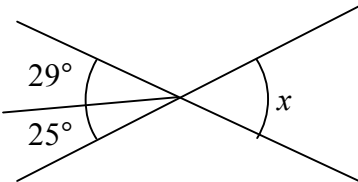
QUESTION ONE

In each diagram calculate the value of the unknown marked x .

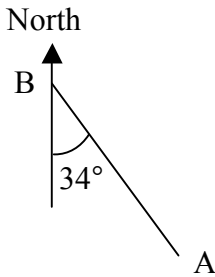
(a)  $x =$ _____ [1]

(b)  $x =$ _____ [1]

(c)  Regular pentagon $x =$ _____ [1]

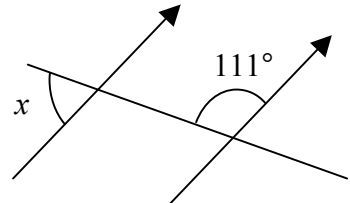
(d)  $x =$ _____ [1]

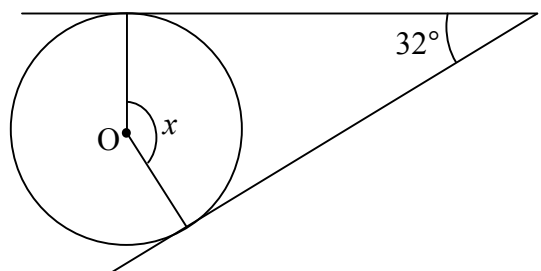
(e) What is the bearing from B to A?

 $\text{Bearing} =$ _____ [2]

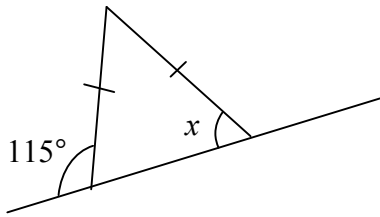
QUESTION TWO

Calculate the value of x in each diagram and give the geometrical reasons.

(a)  $x =$ _____
because _____ [2]

(b)  $x =$ _____
because _____ [2]

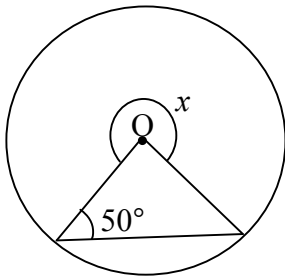
(c)



$x =$ _____

because _____ [2]

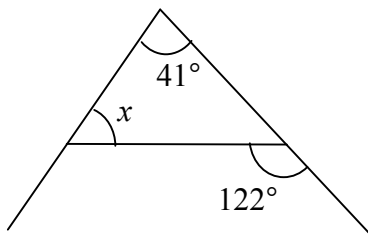
(d)



$x =$ _____

because _____
 _____ [2]

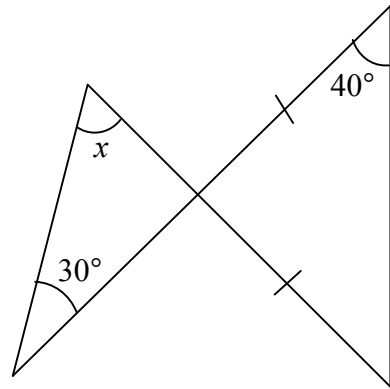
(e)



$x =$ _____

because _____
 _____ [2]

QUESTION THREE



Calculate the value of x in the diagram and give the geometrical reasons.

$x =$ _____

because _____

 _____ [4]

Probability (15 marks)

Serena runs a fruit stall at the local market. She sells apples, oranges, plums and bananas.

QUESTION ONE

(a) Many of Serena’s customers only buy one piece of fruit. For these customers she has the following data.

Fruit	Frequency
Apple	17
Orange	5
Plum	8
Banana	30

(i) What is the probability that the next customer will buy an apple?

_____ [1]

(ii) What is the probability that the next customer will buy an orange or a plum?

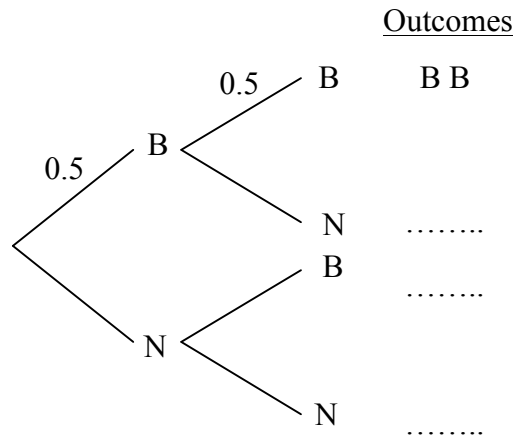
_____ [1]

(iii) What is the probability that the next customer will not buy a plum?

_____ [1]

(b) Serena noticed that half of her single fruit customers bought a banana.

(i) Show the **outcomes** on the probability tree for her next two customers buying a banana (B) or not buying a banana (N).



(ii) What is the probability that neither of her next two customers will buy a banana? [1]

_____ [1]

(iii) What is the probability that at least one of Serena’s next two customers will buy a banana?

_____ [1]

QUESTION TWO

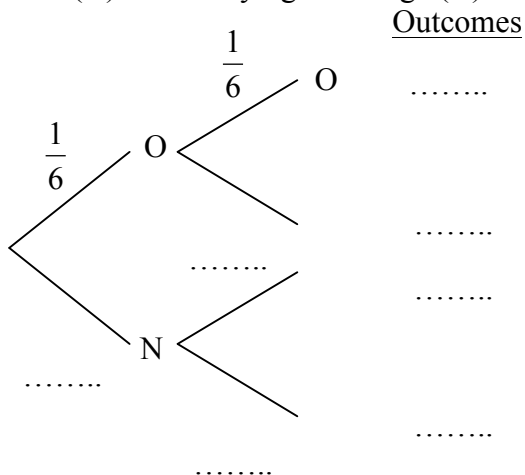
Over all of Serena’s customers, the probability that the next will buy a plum is $\frac{4}{15}$. How many of Serena’s next 60 customers would you expect to buy a plum?

_____ [1]

QUESTION THREE

The overall probability that a customer buys an orange is $\frac{1}{6}$.

- (i) Complete the probability tree for her next two customers buying an orange (O) or not buying an orange (N).



- (ii) What is the probability that neither of the next two customers will buy an orange?

_____ [1]

- (iii) What is the probability that only one of the next two customers will buy an orange?

_____ [2]

QUESTION FOUR

Last Saturday morning Serena served 50 customers.

Of these, 20 spent at least \$25.

Of those that spent at least \$25, 6 paid by cash, 9 paid by EFTPOS and 5 paid by credit card.

Of those that spent less than \$25, 20 paid by cash and the other 10 paid by EFTPOS.

Draw a probability tree that will enable you to calculate the probability of a customer paying by EFTPOS.

[5]