Name: ..... Maths Class: .....

SYDNEY TECHNICAL HIGH SCHOOL

Year 10

MATHEMATICS

ASSESSMENT 2

May, 2019

Time allowed: 70 minutes

General Instructions:

- Write using black or blue pen
- In Questions 6–10, show relevant mathematical reasoning and/ or calculations
- Approved calculators may be used
- Full marks may not be awarded for careless work or illegible writing
- **Begin each question on a new page**
- All answers are to be in the writing booklet provided

Total Marks **60**

Section 1 Multiple Choice

Questions 1-10

10 Marks

Section II Questions 11-15

50 Marks

Section 1

Multiple Choice (10 marks)

Use the multiple choice answer sheet for Question 1-10

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1. The solutions of $x^2 - 12x - 6 = 0$ are

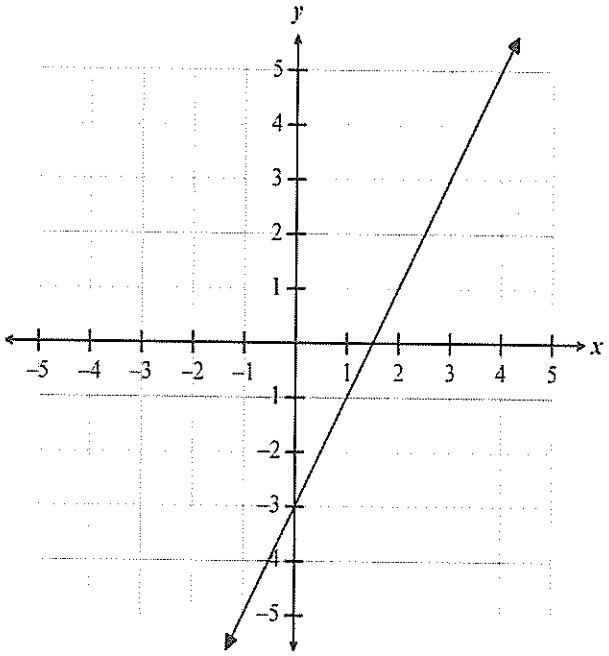
(A) $\frac{12 \pm \sqrt{168}}{2}$

(B) $\frac{-12 \pm \sqrt{120}}{2}$

(C) $\frac{12 \pm \sqrt{120}}{2}$

(D) $\frac{12 \pm \sqrt{168}}{2}$

2. Which equation describes the line shown?



(A) $y = 3x - 2$

(B) $y = -2x - 3$

(C) $y = 2x - 3$

(D) $y = -3x - 2$

3. The letters of the word COONABARABRAN are painted on separate square tiles and placed in a box and delivered to the local council. One of the tiles is drawn out of the box at random. What is the probability that the tile is painted with the letter A?

(A) $\frac{1}{13}$

(B) $\frac{1}{6}$

(C) $\frac{2}{3}$

(D) $\frac{4}{13}$

4. Kellie bought a TV on terms over 2 years and paid a total of $2 442. If the cash price of the TV was $1 650, what rate of simple interest did she pay, per annum?

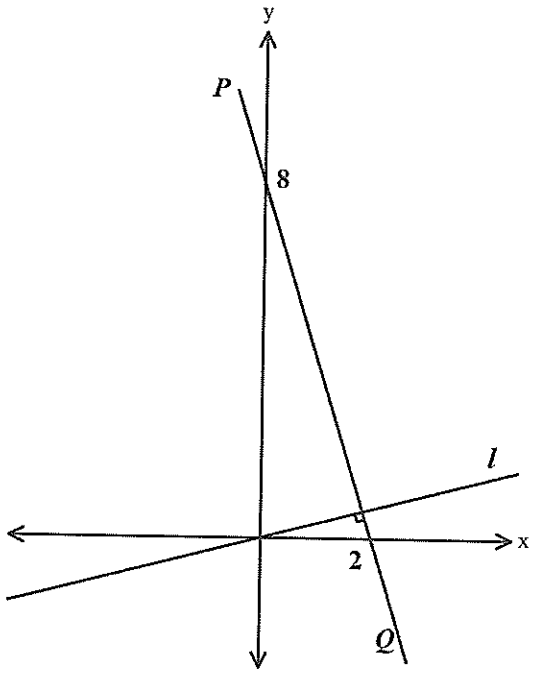
(A) 32% p.a.

(B) 24% p.a.

(C) 48% p.a.

(D) 16% p.a.

5. The equation of the line l through the origin and perpendicular to the line PQ is



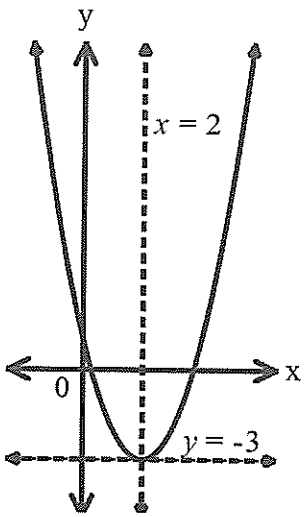
(A) $y = 4x$

(B) $y = -4x$

(C) $y = \frac{1}{4}x$

(D) $y = -\frac{1}{4}x$

6. Which equation best represents the parabola shown?



(A) $y = (x-2)^2 - 3$

(B) $y = (x-2)^2 + 3$

(C) $y = (x+2)^2 - 3$

(D) $y = (x+2)^2 + 3$

7. Paints can be bought in 4 sizes

Which size is the best value for money?

1000 ml cost \$4.50
250 ml costs \$1.12
1200 ml costs \$5.80
2500 ml cost \$10.60



(A) 1000 ml for \$4.50

(B) 250 ml for \$1.12

(C) 1200 ml for \$5.80

(D) 2500 ml for \$10.60

8. $\begin{cases} x + 2y = 45 \\ 2x + y = 15 \end{cases}$ When these simultaneous equations are solved for y.

(A) $y = 10$

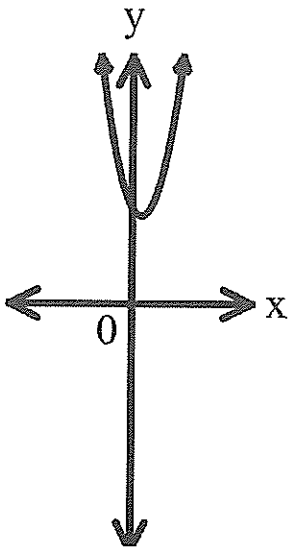
(B) $y = 21$

(C) $y = 25$

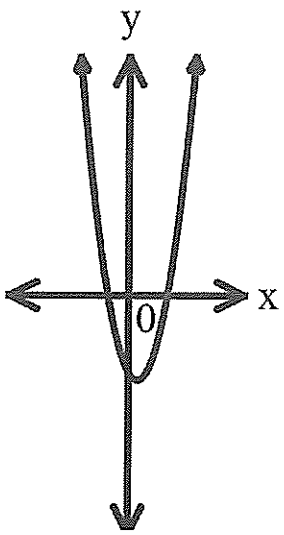
(D) $y = 30$

9. Which of the following could be the graph of $y = x^2 - 2x + 9$

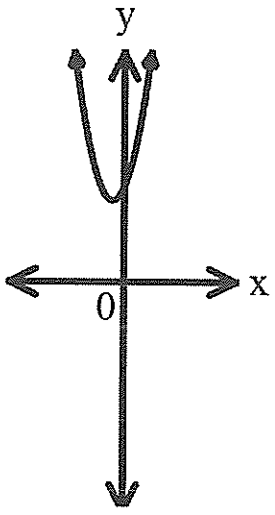
(A)



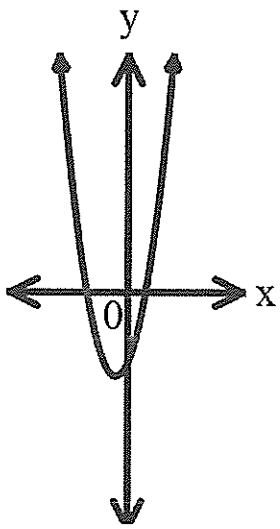
(B)



(C)



(D)



10. For an item originally priced at \$P, its value \$A, after n years of depreciation at r% p.a.

(A) $A = -P\left(1 - \frac{r}{100}\right)^n$

(B) $A = -P\left(\frac{1+r}{100}\right)^n$

(C) $A = P\left(1 - \frac{r}{100}\right)^n$

(D) $A = P\left(\frac{1-r}{100}\right)^n$

Section II
Total Marks (50)
Attempt Questions 11 – 15.

Answer each question in your writing booklet.
In Questions 11-15, your responses should include relevant mathematical reasoning and/or calculations.

Question 11 (10 Marks)

(a) Diamanda works for a hospitality company that pays her normal rates of $20.60 per hour for the first 8 hours of each shift, time and a half for the next 2 hours and double time after that.

i) How much is she paid for an 8 hour shift? **1**

ii) Show that her pay for a shift where she works for 13 hours, would be $350.20. **1**

iii) Diamanda works one 13 hour shift and two 8 hours shifts in a week. She has $15.60 deducted for union fees and 25% of her gross wage deducted for PAYG taxation. What is her net income for the week? **2**

(b) 60 People were surveyed to see which car make was more popular, Toyota or Hyundai. 23 people surveyed said they like both, 13 people like only Hyundai and 7 people didn't like either make of cars.

i) Represent this information in a two-way table below. **2**

	Likes Hyundai	Dislikes Hyundai	Total
Likes Toyota			
Dislikes Toyota			
Total			

Calculate the following probability if one person chosen at random from the group

ii) P(likes Hyundai but not Toyota) **1**

iii) P(Likes Toyota only) **1**

iv) P(Likes either Toyota or Hyundai) **2**

End of Question 11

Question 12 (10 Marks) Use a Separate Sheet of paper

(a) Adrian is a photographer who is paid a retainer of $260.00 per month, plus a royalty of 2% of the sales of his photographs. In the last six months these sales totaled $546 000.00. What was his average weekly income over the last six months? **2**

(b) (i) Factorise $y = 3x^2 - 10x + 8$ **1**

(ii) What is the y intercept? **1**

(iii) By making $3x^2 - 10x + 8 = 0$, solve for x. **1**

(iv) Find the equation of the axis of symmetry to the curve. **1**

(v) Find the coordinates of the vertex to this curve. **1**

(vi) Draw a neat sketch of all the above information. ($\frac{1}{3}$ of your page) **1**

(c) Ignatius goes to a restaurant for dinner.
It offers the following choices.

ENTRÉE	1 vegetarian, 2 seafood and 2 chicken dishes.
MAINS	2 fish, 4 red meat and 2 chicken dishes.
DESSERT	2 chocolate and 3 other flavoured dishes.

(i) How many combinations of three courses are possible? **1**

(ii) If Ignatius doesn't like seafood or fish, how many combinations of three courses are possible for him? **1**

End of Question 12

Question 13 (10 Marks) Use a Separate Sheet of paper

(a) The numbers 1, 2 and 3 are written on three separate red and blue cards. One blue card and one red card is selected at random.

(i) Use a tree diagram to list all elements of the sample space. **1**

(ii) Find the probability of selecting:

(α) a blue 2 and a red 3. **1**

(β) Two cards with the same number. **1**

(b) Indiana Jones considers investing the \$4 500 that he receives for his 18th birthday present from his father for 4 years. He has a choice of two accounts, one that pays 5.8% p.a. compounded annually or 5.4% p.a. compounded monthly.
Which investment would earn more money? **3**

(c) If P is the point (-4, -6) and Q is the point (-2,-2), find:

(i) the gradient of the line PQ; **1**

(ii) the equation of the line PQ; **1**

(iii) the point R if Q is the midpoint of PR **1**

(iv) the distance from P to Q **1**

End of Question 13

Question 14 (10 Marks) Use a Separate Sheet of paper

(a) Iliana earns a salary of $87 500.00 in her job as a public service manager. She also has an income of $1 240.50 from investments and has tax deductions totaling $690.00.

(i) Show that Iliana's taxable income is $88 050.50? **1**

(ii) Using the table below, calculate the income tax that she should pay. **1**

Income ($)	Tax Payable
Up to $18 200	Nil
$18 201-$37 000	19 cents for each $1 over $18 200
$37 001-$87 000	$3 572 plus 32.5 cents for each $1 over $37 000
$87 001-$180 000	$19 822 plus 37 cents for each $1 over $87 000
$1800 001 and over	$54 232 plus 45 cents for each $1 over $180 000

(iii) She also has to pay the Medicare levy which is 2% of her taxable income. How much is her Medicare levy? **1**

(iv) Iliana had $384.00 deducted each week from her income for PAYG taxation. This was intended to cover her income tax and Medicare levy. Calculate her bill or refund for the tax year. **1**

(b) Two machines, A and B, produce pens. It is known that 10% of the pens produced by machine A are faulty and that 5% of the pens produced by machine B are faulty.

(i) One pen is chosen at random from each machine. What is the probability that at least one of the pens is faulty? **1**

(ii) A coin is tossed to select one of the two machines. Two pens are chosen at random from the selected machine. What is the probability that neither pen is faulty? **2**

(c)



HOLIDAY FUN TRAVEL	
Package 1	Package 2
5 nights, $1800 Includes: Return airfare Accommodation	7 night, $2100 Includes: Return airfare Accomodation

What is the cost of a return airfare and accommodation per night? **3**

End of Question 14

Question 15 (10 Marks) Use a Separate Sheet of paper

(a) A picture on a wall measures 22cm by 18cm. It is surrounded by a frame of uniform width.

(i) If the width of the frame is x cm, show that the area of the frame is given by **2**

$A = 4x^2 + 80x \text{ cm}^2$

(ii) The area of the frame is 384 cm^2. What is the width of the frame? **2**

(b) For a particular pair of six sided dice the probabilities that the numbers 1,2,3,4,5,6 appear on the upper most face of each die are in the ratio 1:2:3:4:5:6.
What is the probability of rolling a total of 11 on the two dice? **2**

(c) In certain town 40% of the people have brown hair, 25% have brown eyes, and 15% have brown hair and brown eyes.

i) Draw a Venn diagram to represent this data. **2**

ii) A person is selected at random from the town.

a) If he has brown hair what is the probability that he also has brown eyes? **1**

b) What is the probability that he has neither brown hair nor brown eyes? **1**

End of Examination

☺☺☺

YEAR 10 ASSESSMENT 2 - 2019

Multiple Choice

1. $x^2 - 12x - 6 = 0$

$a = 1$

$b = -12$

$c = -6$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{12 \pm \sqrt{144 + 4 \times 1 \times 6}}{2 \times 1}$

$x = \frac{12 \pm \sqrt{168}}{2}$ A or D

2. $y = mx + b$

$b = -3$

$m = \frac{4}{2} = 2$

$y = 2x - 3$ C

3. $P(A) = \frac{4}{13}$ D

4. $I = 1650$

$I = 792$

$n = 2$

$r =$

$I = Prn$

$792 = 1650 \times r \times 2$

$792 = 3300$

$r = 0.24$ B

5. Gradient of $PQ = \frac{-8}{2} = -4$

Gradient of $l = \frac{1}{4}$ C

6 $y = (x-2)^2 - 3$ A

7. (A) 0.0045
(B) 0.00448
(C) 0.00483 D
(D) 0.00424 cheapest.

8. $x + 2y = 45$
$x = 45 - 2y$
Sub into $2x + y = 15$
$2(45 - 2y) + y = 15$
$90 - 4y + y = 15$
$3y = 75$ C
$y = 25$

9. $y = x^2 - 2x + 9$
$y = x^2 - 2x + 1 + 8$
$y = (x-1)^2 + 8$ A

10 $A = P\left(1 - \frac{r}{100}\right)^n$ C

Question 11

a i) $\$20.60 \times 8 = \$164.80$

ii) $20.60 \times 8 = \$164.80$

$20.60 \times 1\frac{1}{2} \times 2 = 61.80$

$20.60 \times 2 \times 3 = \$123.60$ +

$\$350.20$

iii) $\$350.20 + 2 \times \$164.80 = \$679.80$

$(679.80 - 15.60) \times 0.75 = \$498.15$

b i)

	Likes Hyundai	Dislikes Hyundais	Total
Likes Toyota	23	17	40
Dislikes Toyota	13	7	20
Total	36	24	60

b ii) P(likes Hyundai but not Toyota) $= \frac{13}{60}$

b iii) P(likes Toyota only) $= \frac{17}{60}$

b iii) P(likes either Toyota or Hyundai) $= 1 - \frac{7}{60}$

$= \frac{53}{60}$ - (2)

(1 mark) was awarded for

$\frac{17+13}{60} = \frac{30}{60} = \frac{1}{2}$ (incorrect)

Question 12

a) $\$260 \times 6 \div 26 = \$60$

$0.02 \times 546\,000 \div 26 = 420$

$60 + 420 = \$480.$

OR

$\$260 \div 4 = 65$

$0.02 \times 546\,000 \div 26 = 420.$

$65 + 420 = \$485$

b i) $y = 3x^2 - 10x + 8$

$y = (3x-4)(x-2)$

ii) y-intercept $= 8$

iii) $0 = (3x-4)(x-2)$

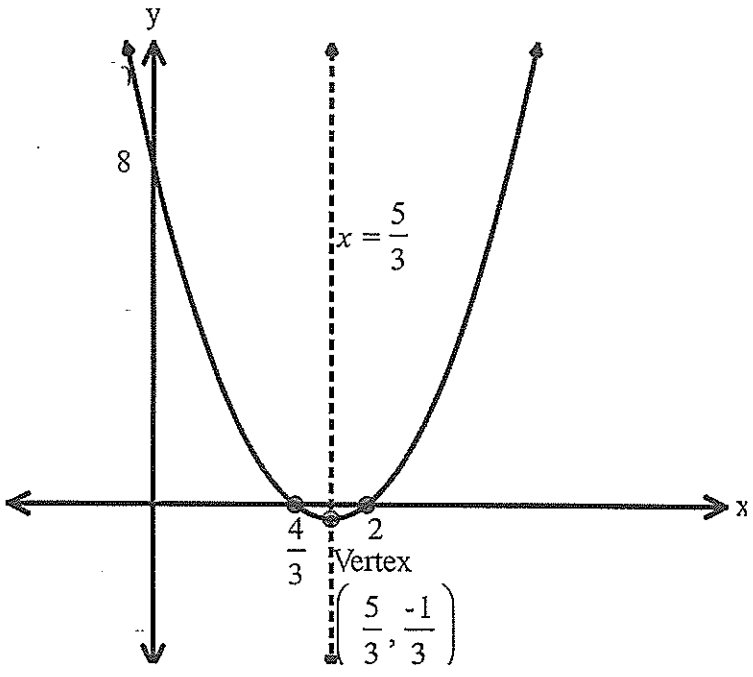
$x = \frac{4}{3} \quad x = 2$

iv) $x = \frac{-b}{2a}$

$x = \frac{10}{6}$

$x = \frac{5}{3}$

v) Vertex $\left(1\frac{2}{3}, -\frac{1}{3}\right)$

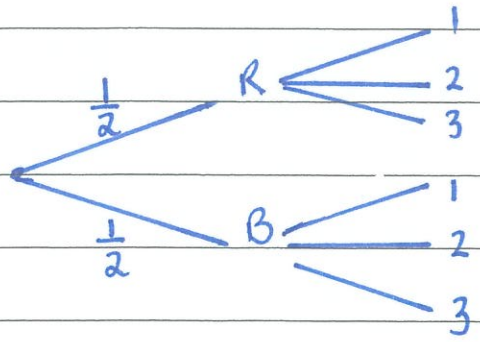


c i) $5 \times 8 \times 5 = 200$

ii) $3 \times 6 \times 5 = 90$

Question 13

i)



iiα) P(Blue 2 and Red 3) $= \left(\frac{1}{2} \times \frac{1}{3}\right) + \left(\frac{1}{2} \times \frac{1}{3}\right)$

$= \frac{1}{3}$

iiβ) P(Two cards with the same number) $= \frac{1}{3}$

b)

$P = \$4500$

$n = 4$

$r = 5.8\%$

$A = 4500(1 + 0.058)^4$

$= \$5638.39$

$\$P = \$4500$

$n = 4 \times 12 = 48$

$r = 0.054 \div 12 = 0.0045$

$A = 4500(1 + 0.0045)^{48}$

$= \$5582.26$

5.8% pa earns more money

c) $P(-4,-6)$ $Q(-2,-2)$

i) Gradient $= \frac{-6--2}{-4--2} = 2$

ii) Equation of PQ

$y+6 = 2(x+4)$

$y+6 = 2x+8$

$y = 2x+2$

iii) $P(-4,-6)$ $Q(-2,-2)$ $R(x,y)$

$-2 = \left(\frac{-4+x}{2}\right)$ $\quad -2 = \frac{-6+y}{2}$

$-4 = -4+x$ $\quad -4 = -6+y$

$x = 0$ $\quad y = 2$

$R(0,2)$

iv) $d = \sqrt{(-4+2)^2 + (-6+-2)^2}$

$d = \sqrt{4+16}$

$d = \sqrt{20}$

$PQ = 2\sqrt{5}$ units

Question 14

a i) $87500 + 1240.50 - 690 = \$88\,050.50$

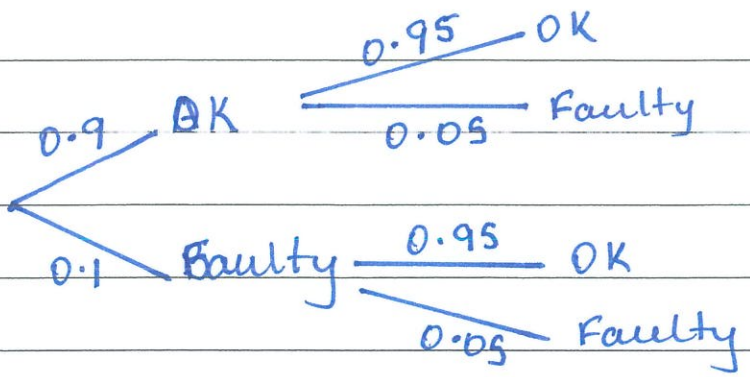
ii) $TAX = \$19\,822 + 0.37(88\,050.50 - 87\,000)$
$= \$20\,210.69$

iii) Medicare Levy $= 2\% \times 88\,050.50 = \$1761.01$

iv) $384 \times 52 = \$19\,968$
$\$20\,210.69 + \$1761.01 = \$21\,971.70$.
$21\,971.70 - 19968 = \$2003.70$

Iliana will be sent a bill of $\$2003.70$

b i



i) P(at least one is faulty) $= 1 - (0.9 \times 0.95)$
$= 0.145$

ii) P(neither pen is faulty) $= \frac{1}{2} \times (0.9)^2 + \frac{1}{2}(0.95)^2$
$= 0.85625$

Question 14.

c) $5x + y = 1800 \quad -(1)$

$7x + y = 2100 \quad -(2)$

$1800 - 5x = y$

$2100 - 7x = y$

$1800 - 5x = 2100 - 7x$

$2x = 300$

$x = 150$ accomodation

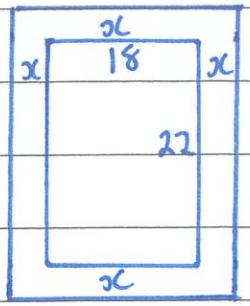
$y = 1800 - 5x$

$y = 1800 - 5 \times 150$

$y = \$1050$ flight

Question 15

a)



$A = (22+2x)(18+2x)$

$= 396 + 44x + 36x + 4x^2$

$= 4x^2 + 80x + 396$

Area of Picture $= 22 \times 18 = 396$

Area of frame $= 4x^2 + 80x$

$384 = 4x^2 + 80x$

$0 = 4x^2 + 80x - 384$

$0 = x^2 + 20x - 96$

$0 = (x-4)(x+24)$

$x = 4$ $\qquad$ $x = -24$

No Solution

$\therefore$ width of frame is 4cm

b) $P(1)=1$ $\quad P(2)=2$ $\quad P(3)=3$ $\quad P(4)=4$ $\quad P(5)=5$ $\quad P(6)=6$

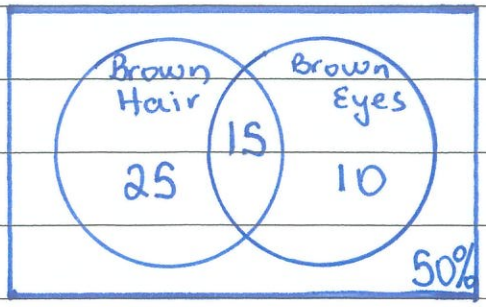
$P(\text{Rolling an } 11) = (5+6) \text{ or } (6+5)$

$= \left(\frac{5}{21} \times \frac{6}{21}\right) + \left(\frac{5}{21} \times \frac{6}{21}\right)$

$= \frac{60}{441}$

$= \frac{20}{47}$

c i)



c ii) $P(\text{Brown hair \& brown eyes}) = \frac{15}{40}$

iii) $P(\text{neither brown hair nor brown eyes}) = \frac{1}{2}$ (50%)