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

SYDNEY TECHNICAL HIGH SCHOOL

Year 10

Mathematics

Assessment

May, 2015

Time allowed: 70 minutes

General Instructions:

- Marks for each question are indicated on the question.
- Approved calculators may be used
- All necessary working should be shown
- Full marks may not be awarded for careless work or illegible writing
- Write using black or blue pen

Quadratic Equations	/12
Graphs	/14
Probability	/12
Consumer Arithmetic	/11
Miscellaneous	/14
Total	/63

QUESTION 1 (12 marks) **QUADRATIC EQUATIONS** **MAR**

1. Solve $4x(2x-3)=0$ (1)

2. Solve $4x^2=25$ (2)

3. Solve $x^2-4x-21=0$ (2)

4. Solve $2x^2-5x-2=0$ using the quadratic formula. Give your solution in surd form. (2)

5. Solve $(3x-5)^2=0$ (1)

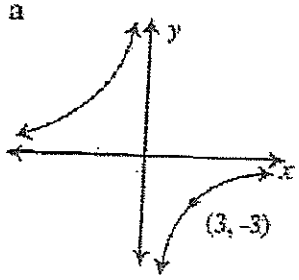
6. Solve $x-\frac{4}{x}=\frac{5}{3}$ (2)

7. Solve $a^2+4a-2=0$ by completing the square. (2)

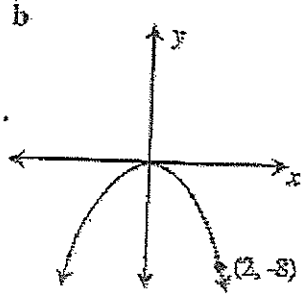
QUESTION 2 (14 marks) **LINEAR AND NUMBER PLANE GRAPHS** **MARK**

1. Match each graph to its equation. (4)

a



b



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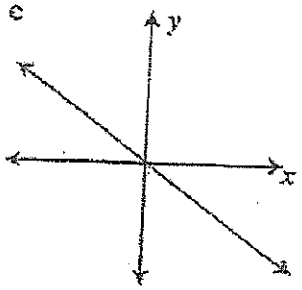

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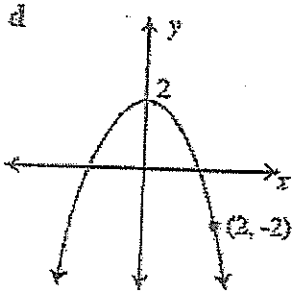


(a) _____

(b) _____

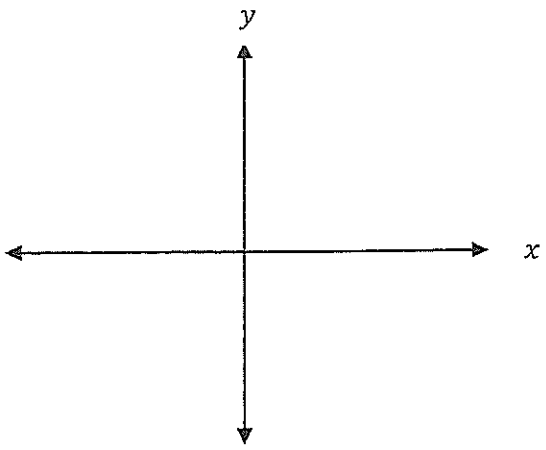
(c) _____

(d) _____

A $y = 3^x$ B $y = -x$ C $y = -\frac{9}{x}$

D $y = x^3$ E $y = -2x^2$ F $y = -x^2 + 2$

2. a) Carefully graph the graphs of $x^2 + y^2 = 1$ and $x + y = 1$ on the number plane given below. (2)



b) Find the intersection points given that they have integer points. (1)

_____

_____

_____

3. For the quadratic equation $y = x^2 + 2x - 3$, find

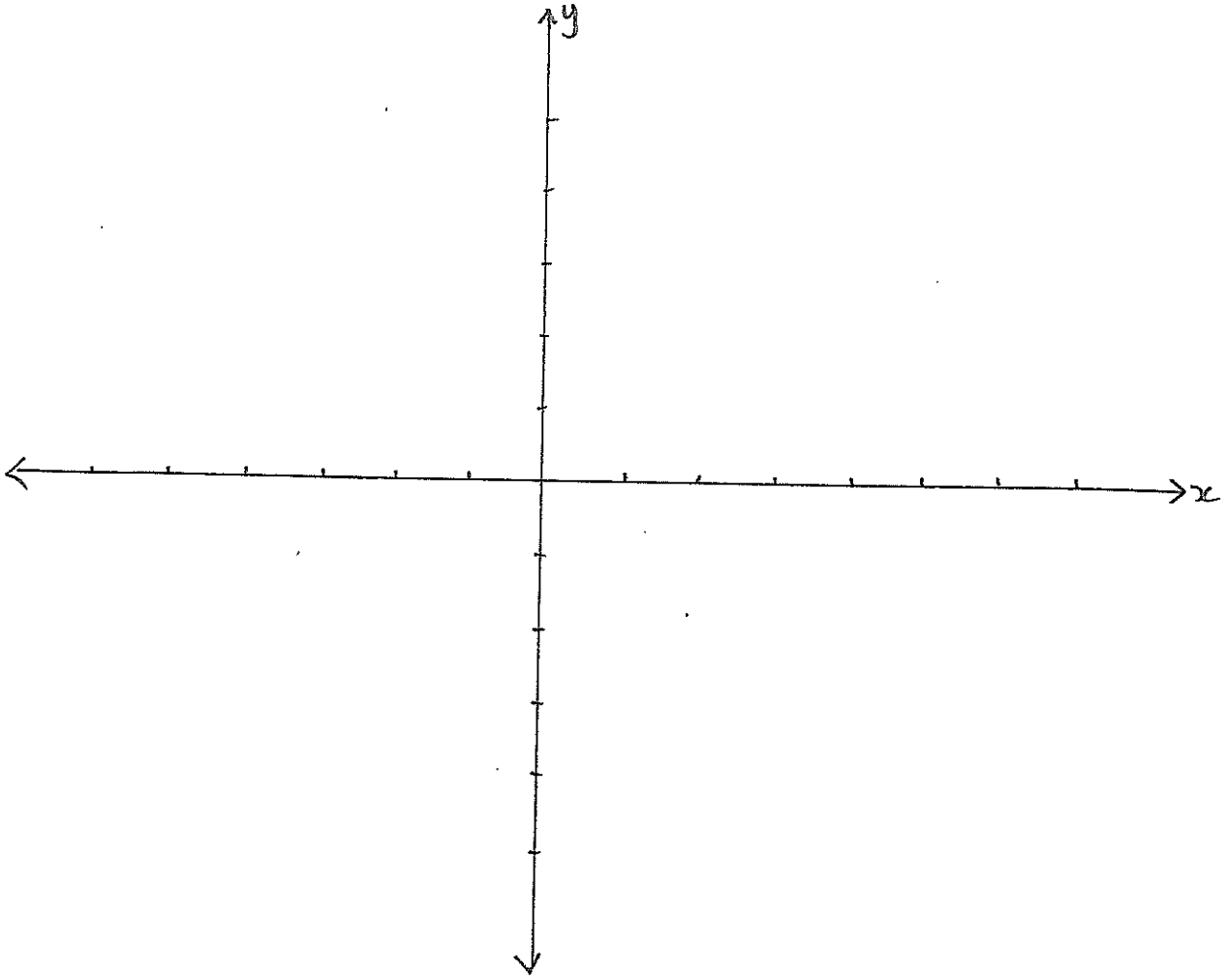
a) the y –intercept (1)

b) x intercepts (2)

c) the axis of symmetry (1)

d) the vertex (1)

e) Graph $y = x^2 + 2x - 3$ (2)



QUESTION 3 (12 marks) **PROBABILITY** **MARK**

1. A jar contains 10 yellow, 4 black, 3 blue, 5 white, 1 pink and 2 red jelly beans. One jelly bean is taken out at random. What is the probability that it is neither blue nor white? (1)

2. If a standard die is rolled 600 times, how many times would you expect a 2 to appear? (1)

3. A family is planning to have 3 children

   a) Draw a tree diagram that shows all possible outcomes. (1)

   b) What is the probability that they will have at least one boy? (1)

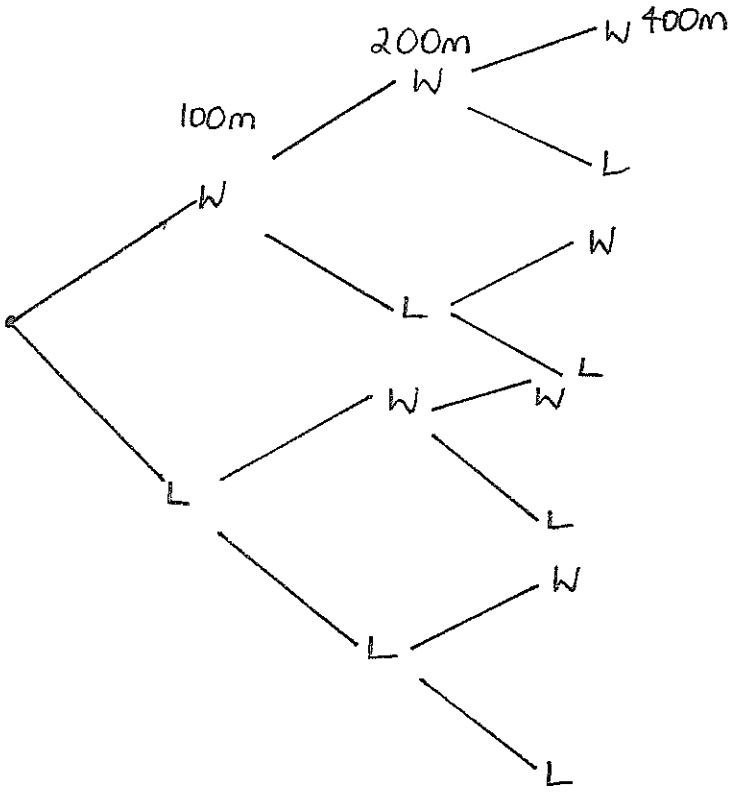
4. In a survey of 60 people, it was found that 40 people liked lemonade, whereas 30 people liked cola. Two people said they disliked both. Using a Venn Diagram or otherwise answer the following questions.

   If one person is chosen at random, find the probability that

   a) they like lemonade only (1)

   b) they like lemonade and cola (1)

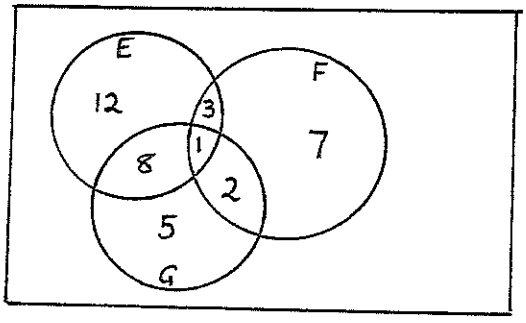
5. An athlete competes in a 100m, a 200m and a 400m race and his chances of winning are respectively 0.5, 0.3 and 0.2. Using the following tree diagram, what is the probability that



a) he does not win any of the 3 races. (1)

b) he wins at least 2 of the races. (2)

6.



If the sets E, F and G in the diagram represent the languages spoken at a backpackers hotel (E=English, F=French, G=German), what is the probability that a backpacker selected at random from the hotel speaks:

a) English (1)

b) French but not English (1)

c) German and English (1)

QUESTION 4 (11 marks) **CONSUMER ARITHMETIC** **MARI**

1. Michael invested $5000 for 4 years at a simple interest rate of 7%pa. Calculate the interest earned on his investment. (1)

2. A car is valued at $32000 when it is new. It depreciates at 10% pa. What will it be worth after 4 years? (2)

3. $4000 is invested for 2 years at 6% pa compounded half yearly. Find the amount to which it accumulates? (2)

4. The table below shows the monthly payments required to repay each $1000 of a housing loan at monthly reducible interest rates.

Interest Rate pa	20 years	25 years	30 years
5%	6.60	5.85	5.37
5.25%	6.74	5.99	5.52
5.5%	6.88	6.14	5.68
5.75%	7.02	6.29	5.84
6%	7.16	6.44	6.00
6.25%	7.31	6.60	6.16
6.5%	7.46	6.75	6.32

Raymond borrowed $370 000 over 25 years at 5.75% pa monthly reducible interest.

a) What is the monthly repayment on this loan? (1)

b) Later that day the interest rate rose to 6.25% pa. How much extra will he have to pay over the course of the loan as a result of the rate rise? (2)

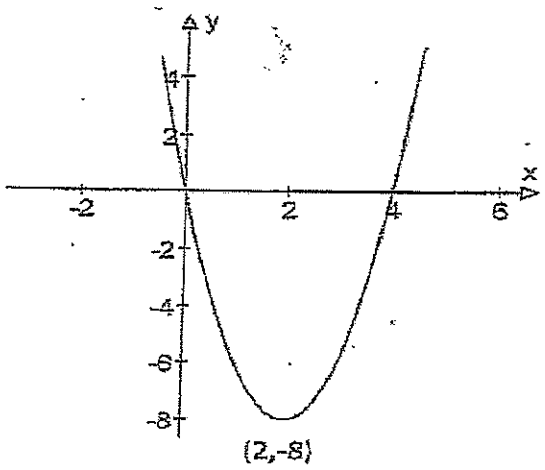
5. Peter bought an LED TV priced at $3600. He makes 24 monthly repayments of $159.75.

a) How much does Peter pay for the TV? (1)

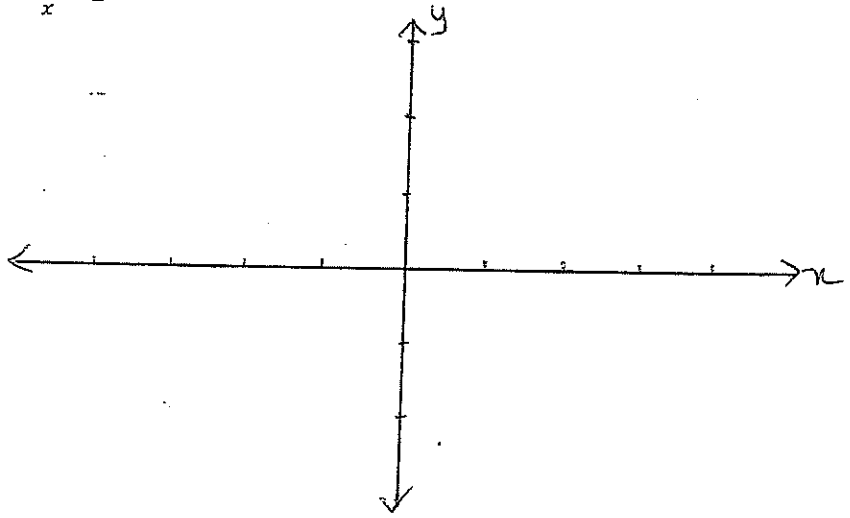
b) What is the rate of simple interest charged per year? (2)

QUESTION 5 (14 marks) **MISCELLANEOUS** **MARK**

1. Find the equation of the following parabola in the form of $y = 2(x-h)^2 + k$ (2)

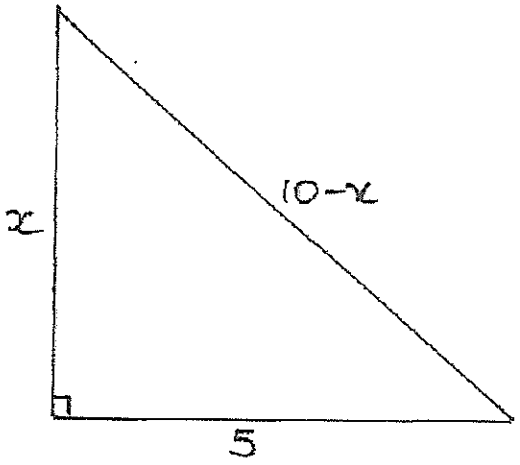


2. Graph $y = \frac{6}{x} - 1$ (2)



3. Sarah bought a microwave for $161.50. The microwave was marked down by 15% and then she received a further 5% discount for paying cash on the already reduced price. What was the original price of the microwave before both discounts? (2)

4. Find the area of the triangle by firstly finding the value of x. (3)



5. Data on the cholesterol level of a group of people was collected and summarised in the table below:

	Low	**Normal**	**High**	Totals
Men	16		26	
Women		22	14	60
Totals		50		

a) Complete the table. (1)

b) If a person is chosen at random, what is the probability that they are:

(i) male with normal cholesterol level? _____ (1)

(ii) female with a low cholesterol level? _____ (1)

c) If a woman is chosen at random, what is the probability that she:

(i) has a normal cholesterol level? _____ (1)

(ii) does not have a low cholesterol level? _____ (1)

QUESTION 1 Quadratic Equation

1. $4x(2x-3)=0$

$x=0, \quad x=3/2$

2. $4x^2-25=0$

$(2x-5)(2x+5)=0$

$x=\pm 5/2$

3. $x^2-4x-21=0$

$(x-7)(x+3)=0$

$x=7, -3$

4. $2x^2-5x-2=0$

$x=\dfrac{5\pm\sqrt{25-4\cdot 2\cdot -2}}{4}$

$x=\dfrac{5\pm\sqrt{41}}{4}$

5. $x=5/3$

6. $x-\dfrac{4}{x}=\dfrac{5}{3}$

$3x^2-12=5x$

$3x^2-5x-12=0$

$3x^2-9x+4x-12=0$

$3x(x-3)+4(x-3)=0$

$(3x+4)(x-3)=0$

$x=-\dfrac{4}{3}, 3.$

7. $a^2+4a+4=2+4$

$(a+2)^2=6$

$a+2=\pm\sqrt{6}$

$a=\pm\sqrt{6}-2$

QUESTION 2 LINEAR + NO. PLANE GRAPHS

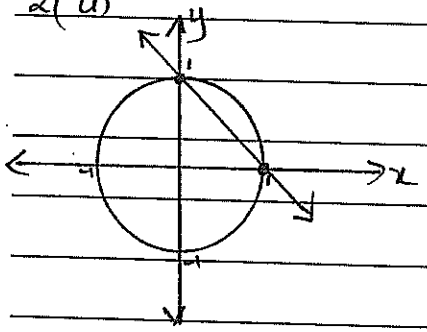
1(a) C

(b) E

(c) B

(d) F

2(a)



(b) (1,0) (0,1)

3. For $y=x^2+2x-3$

(a) y intercepts let $x=0$

$y=-3 \quad (0,-3)$

(b) x intercepts let $y=0$

$x^2+2x-3=0$

$(x+3)(x-1)=0$

$x=-3, 1 \quad (-3,0)(1,0)$

(c) the axis of symmetry

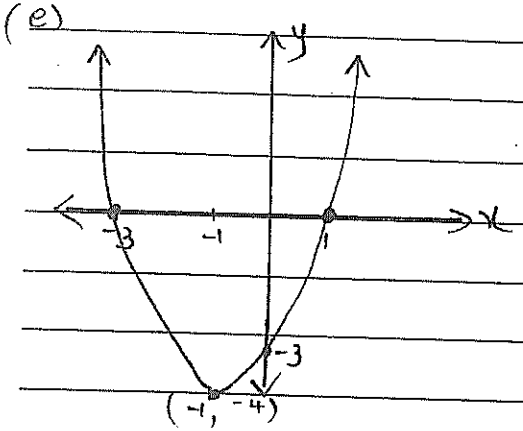
$x = \frac{-b}{2a}$

$x = \frac{-2}{2} = -1$

(d) Vertex when $x = -1$

$y = -4$ $(-1, -4)$

(e)

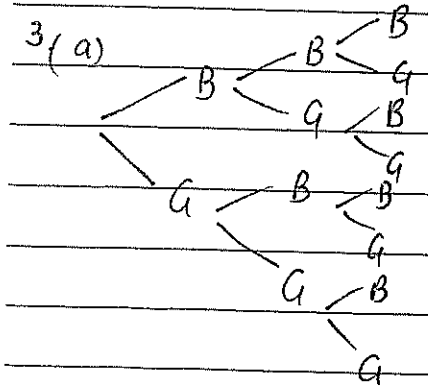


QUESTION 3 PROBABILITY

1. P(neither blue nor white) = $\frac{17}{25}$

2. $\frac{1}{6} \times 600 = 100$ times

3 (a)

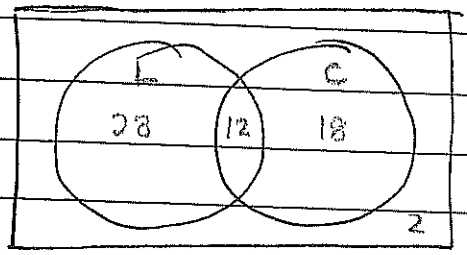


(b) $1 - P(GGG)$

$= 1 - \frac{1}{8}$

$= \frac{7}{8}$

4.



(a) $P(\text{Lemonade}) = \frac{28}{60} = \frac{7}{15}$

(b) $P(L+C) = \frac{12}{60} = \frac{1}{5}$

5. (a) $P(LLL) = 0.5 \times 0.7 \times 0.8 = 0.28$

(b) $P(\text{wins at least 2}) = (0.5 \times 0.3 \times 0.2) + (0.5 \times 0.3 \times 0.8) + (0.5 \times 0.7 \times 0.2) + (0.5 \times 0.3 \times 0.2)$

$= 0.25$

6. (a) $P(\text{English}) = \frac{24}{38} = \frac{12}{19}$

(b) $P(\text{French but not English}) = \frac{9}{38}$

(c) $P(\text{Germ} + \text{English}) = \frac{9}{38}$

QUESTION 4 CONSUMER ARITHMETIC

1. $I = 5000 \times \frac{7}{100} \times 4$

$I = \$1400$ 1

2. $A = 32000\left(1 - \frac{10}{100}\right)^4$ 2

$A = \$20995.20$

3. $A = 4000\left(1 + \frac{3}{100}\right)^4$ 2

$A = \$4502.04$

4 (a) Repayment $= 6.29 \times 370$

$= \$2327.30$ per month 1

(b) Repayment $= 6.60 \times 370$

$= \$2442$ per month

Loan② $= 2442 \times 25 \times 12 = 732600$

Loan① $= 2327.30 \times 25 \times 12 = 698190$

Extra paid $= \$34410$ 2

5. (a) $24 \times 159.75 = \$3834$ 1

(b) $I = 3834 - 3600$

$I = \$234$

$I = PRN$

$234 = 3600 R.2$

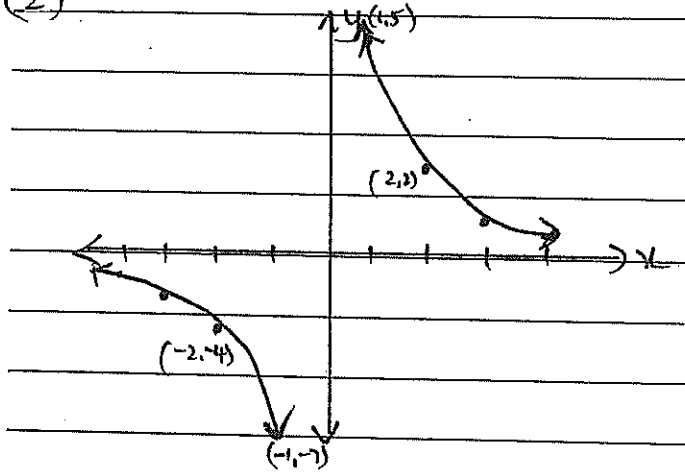
$R = \frac{13}{400} \times 100 = 3.25\%$ p.a. 2

QUESTION 5 MISCELLANEOUS

(1) $h = 2$

$k = -8$

(2)



$y = \frac{6}{x} - 1$

(3) Let x be original price

$\frac{95}{100}\left(\frac{85x}{100}\right) = 161.50$

$x = \$200.$

(4) $(10-x)^2 = x^2 + 5^2$

$100 - 20x + x^2 = x^2 + 5^2$

$75 = 20x$

$x = \frac{15}{4}$

Area $= \frac{1}{2} \times 5 \times \frac{15}{4}$

$= 9.375\ u^2$

5.

	L	N	H	T
(a) M	16	28	26	70
W	24	22	14	60
T	40	50	40	130

(b) (i) $\frac{28}{130} = \frac{14}{65}$ (ii) $\frac{24}{130} = \frac{12}{65}$.

(c) (i) $\frac{22}{60} = \frac{11}{30}$ (ii) $\frac{36}{60} = \frac{3}{5}$