KINCOPPAL – ROSE BAY
SCHOOL OF THE SACRED HEART

HIGHER SCHOOL CERTIFICATE
ASSESSMENT TASK 2, 2010
HALF YEARLY EXAMINATION

General Mathematics

General Instructions

- Reading time – 5 minutes
- Working time – 2 hours and 30 minutes
- Write using black or blue pen
- Graphics calculators may be used
- Attempt all questions
- Use a new booklet for each question
- You must submit a booklet for each question even if you do not attempt the question
- A formula sheet is provided at the back of this paper

Total Marks – 100

Section 1 Pages 3 -8

22 marks

- Attempt Questions 1 – 22
- Allow about 30 minutes for this section

Section 2 Pages 9- 17

78 marks

- Attempt Questions 23 – 25
- Allow about 2 hours for this section

Section 1
22 Marks
Attempt questions 1-22

Use the multiple choice answer sheet for questions 1-22

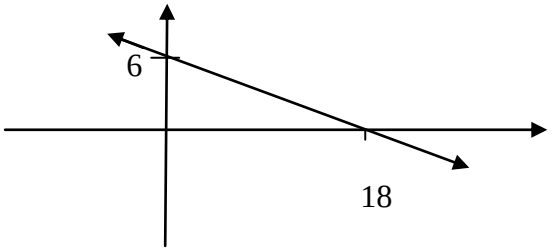
1. The area of a circular plate of radius 2.75 cm is

   (A) $17.28\ \text{cm}^2$ (B) $18.17\ \text{cm}^2$ (C) $237.5\ \text{cm}^2$ (D) $23.76\ \text{cm}^2$

2. Order the following from least likely to most likely:
   (i) That a pregnant woman will give birth to a boy.
   (ii) That a pregnant woman will give birth.
   (iii) That a woman who becomes pregnant three times will end up with two children of one sex and one child of the other sex.
   (iv) That a woman who becomes pregnant twice will end up with a boy each time.

   (A) (iv), (i), (iii), (ii) (B) (ii), (i), (iii), (iv)
   (C) (iii), (iv), (i), (ii) (D) (i), (iii), (iv), (ii)

3. The equation of the line graphed below is



   (A) $y = 3x + 6$ (B) $y = \frac{1}{3}x + 6$

   (C) $y = -3x + 6$ (D) $y = -\frac{1}{3}x + 6$

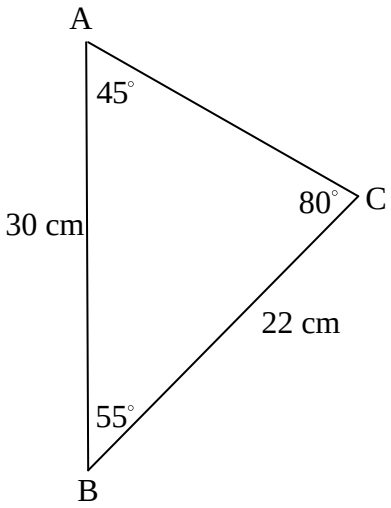
4. Assuming the Earth has a radius of 6 400 km, the distance on its surface from the Equator to $10^\circ N$

   (A) 559 km (B) 600 km (C) 1117 km (D) 3 574 km

5. A quality inspector in a factory samples every 100^{th} bottle of shampoo. This is an example of

   (A) Random sampling (B) Stratified Sampling
   (C) Discrete Sampling (D) Systematic Sampling

6.



Which formula is used when using the Cosine Rule to find an expression for the length of the side AC:

(A) $b^2 = 22^2 + 30^2 - 2 \times 22 \times 30 \times \cos 80^\circ$
(B) $b^2 = 22^2 + 30^2 - 2 \times 22 \times 30 \times \cos 45^\circ$
(C) $b^2 = 22^2 + 30^2 - 2 \times 22 \times 30 \times \cos 55^\circ$
(D) $b^2 = 22^2 + 45^2 - 2 \times 22 \times 45 \times \cos 55^\circ$

7. In a school of 840 students there are

Number of Students	**Year Group**
160	12
145	11
140	10
140	9
125	8
110	7

A survey of 60 students is to be carried out. The number of Year 12 students chosen in a stratified sample would be

(A) 10 (B) 11 (C) 15 (D) 20

8. Bus fares have historically automatically risen by 3% p.a. every year. **Last** year I paid $6.50 for my bus ticket to school, so **next** year I should expect to pay

(A) $6.34 (B) $6.70 (C) $6.90 (D) $10.93

9. Solve for n: $5^n = 2.4$

(A) 0.54 (B) 0.55 (C) 0.56 (D) 0.57

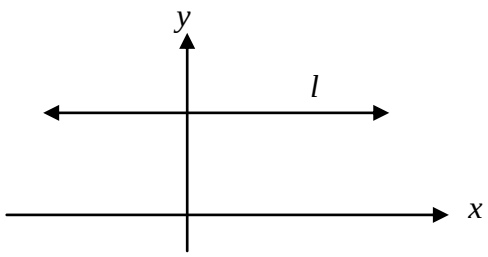
10. Convert 4.3 cm^2 to mm^2

(A) 43 mm^2 (B) 430 mm^2 (C) 4300 mm^2 (D) 43000 mm^2

11. Jason wants to estimate the number of fish in a lake. He catches 40 fish and tags them. Then he releases them back into the lake. On the following day he catches 30 fish and finds that 3 have tags. How many fish does he estimate to be in the lake?

(A) 400 (B) 390 (C) 300 (D) 70

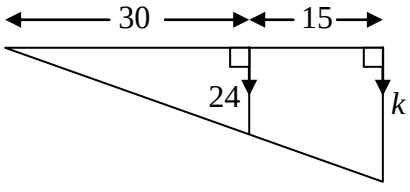
12.



The gradient of the line *l* on the graph is

(A) Positive (B) Negative
(C) Zero (D) None of these

13. The value of *k* in the diagram is



(A) 12 (B) 15 (C) 30 (D) 36

14. A ship travels 720 nautical miles in 24 hours. It's speed is

(A) 32 nm/h (B) 24 M/h
(C) 17 280 m/h (D) 30 knots

15. Peter, the plumber, earns $26/h and dirt money of 75c/h. Calculate his weekly wage in a week when he works for 47 hours **including both** 10 hours in dirty conditions **and** 7 hours at time-and-a-half.

(A) $1222.00 (B) $1313.00 (C) $1320.50 (D) $1975.50

16. Anna invests $4500 for 5 years at 6.5% p.a. interest compounding quarterly? How much **interest** does she earn?

(A) $1 711.89 (B) $6 211.89 (C) $91 426.42 (D) $15856.40

17. Claire is conducting a survey on musical interests in teenagers. What is the best way for her to conduct the survey?

(A) Ask the people at the party she attends on Saturday night at the surf club.
(B) Send her survey forms to the high school for completion by all the students.
(C) Listen to the music request show on the radio and count the requests.
(D) Question people outside the local music store for four hours on Saturday morning

18. Express 3401526989.56 in scientific notation correct to 3significant figures.

(A) 3.40×10^{-9} (B) 3.401×10^{-9} (C) 3.40×10^{9} (D) 3.401×10^{9}

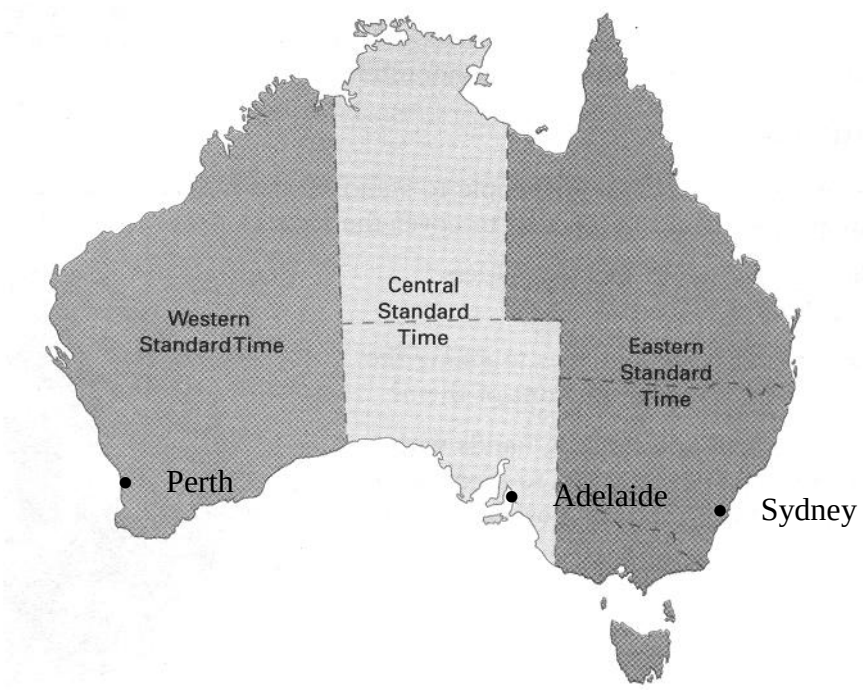
19. Solve for x: $\frac{x+3}{6}-\frac{x+2}{5}=10$

(A) -297 (B) 27 (C) 17 (D) 7

20. The drought has been particularly bad this summer with a 20% chance of rain and a 15% chance of storms. The probability of **neither** rain nor storms is:

(A) 0.68 (B) 0.03 (C) 0.71 (D) 0.35

Use the map and the information shown to answer Question 21 and 22



0 h	+ 1.50 h	+2 h

21 Calculate the time in Perth in June when it is 2 pm in Adelaide .

(A) 12:30 pm (B) 3:30 pm (C) 4:00 pm (D) 2:00 pm

22 A plane leaves Perth at midnight on Sunday night on a 3 hour flight to Sydney in June. What time does it arrive in Sydney?

(A) 1:00 am (B) 2:00 am (C) 3:00 am (D) 5:00 am

End of Multiple Choice Section

Section 2

78 Marks
Attempt questions 23-28
Allow about 2 hours for this section

Answer each question in a separate writing booklet. Extra writing booklets are available.
All necessary working should be shown in every question.

Question 23 (13 Marks)

(a) XYZ Company shares are trading at $26.20. They announce a dividend of 40c/share. Zoe owns 3500 XYZ shares.

(i) Calculate the amount of dividend that Zoe receives. **1**

(ii) Calculate the dividend yield. **1**

(iii) Zoe bought the shares for $21.80. She decides to sell all the shares. How much profit did she make? (Do not include the dividend). **2**

(iv) Zoe works as a hairdresser and earns $28/h. Her normal working week is 40 hours. Zoe can claim $15/week laundry costs as a tax deduction. Calculate her taxable income including **all** the income from the shares. **2**

Zoe sells all her shares to place a deposit on a house. Together with her other savings she now has $85 000 altogether as a deposit. The unit she is buying cost $455 000 so she must borrow $370 000. She will repay the loan in **25 years** and interest is charged at **8.5% pa.** The table shows the monthly repayments on a **$1 000 loan**.

Monthly Repayments on a **$1 000** loan						
Interest Rate	10 years	12 years	15 years	17 years	20 years	25 years
8.25%	$12.27	$10.96	$9.70	$9.13	$8.52	$7.88
8.5%	$12.40	$11.10	$9.85	$9.28	$8.68	$8.05
8.75%	$12.53	$11.24	$9.99	$9.43	$8.84	$8.22
9%	$12.67	$11.38	$10.14	$9.59	$9.00	$8.39
9.25%	$12.80	$11.52	$10.29	$9.74	$9.16	$8.56
9.5%	$12.94	$11.66	$10.44	$9.90	$9.32	$8.74
9.75%	$13.08	$11.81	$10.59	$10.05	$9.49	$8.91
10%	$13.22	$11.95	$10.75	$10.21	$9.65	$9.09
12%	$14.35	$13.15	$12.00	$11.55	$11.01	$10.35

(v) Use the table to calculate the monthly repayments on Zoe's loan. **1**

(vi) How much will Zoe repay altogether over the 25 years? **1**

(vii) How much interest will Zoe pay over the period of the loan. **1**

(viii) Zoe decides to make fortnightly repayments instead of monthly repayments. Give **one** advantage in doing this. **1**

Question 23 (continued)

(b) The marks from a Quiz are displayed in the table

Scores	Frequency
4	1
5	1
6	4
7	10
8	12
9	14
10	5

(i) Use your calculator to produce the five figure summary for this data. **1**

(ii) Use the five figure summary to draw a box and whisker plot to display the spread of the scores. **2**

End of Question 23

Question 24 (13 Marks) Use a separate booklet

(a) Calculate the probability in drawing the following cards from a standard deck of 52 cards.

(i) An ace **1**

(ii) A heart **1**

(iii) The Queen of Spades **1**

(iv) A court card **1**

(You must express your answers in the simplest form).

(b) A roulette wheel has 18 red, 18 black and 1 green squares. Explain why the probability of scoring red is less than an even chance. **1**

(c) A bag of 25 marbles contains 4 red marbles, 6 orange marbles, 8 blue marbles and the rest are green.

(i) Calculate the percentage of green marbles. **2**

(ii) What is the probability of choosing a red marble? **1**

(iii) What is the probability of choosing a marble that is **not** red? **1**

(d) A poker machine has 5 wheels each with 20 different symbols on them. How many different combinations can be spun? **1**

(e) There are 17 horses entered in the Melbourne Cup. Assuming they all have an equal chance of winning,

(i) In how many ways can the first three places be filled? **1**

(ii) What is the probability that these three places are filled by Midnight Girl, Abacus Lass and Lady Luck, in any order? **1**

(iii) What is the probability that Abacus Lass comes first, Midnight Girl second and Lady Luck comes third? **1**

End of Question 24

Question 25 (13 Marks) **Use a separate booklet**

(a) Monica buys a new TV costing $7 500 on hire purchase. She pays a 20% deposit and then pays $200 per month for the next 4 years.

(i) What is the amount of the deposit that Monica pays? **1**

(ii) What is the balance owing on the TV after she has paid the deposit? **1**

(iii) How much did Monica pay in total for the TV under the terms of the hire purchase? **1**

(iv) How much interest did Monica pay? **1**

(v) What was the flat rate of interest charged ? **2**

(b) Solve

(i) $2x+6=4x-8$ **1**

(ii) $\frac{x}{5}+\frac{7x}{10}=18$ **2**

(c) Solve for d **2**

$54=2d^3$

(d) Rearrange the equation to make y the subject of the equation **2**

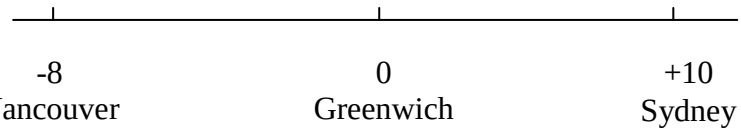
$k=4\pi+\frac{2}{3}y$

End of Question 25

Question 26 (13 Marks) Use a separate booklet

(a) Radio Announcement: …"and now it's 7:30 on Tuesday morning radio as we cross from Sydney to Vancouver where Torah Bright is limbering up before her first run on the Snowboard Half Pipe"…

(i) Use the time line below to calculate the time **and** day in Vancouver when this announcement was made. **1**



(ii) On her second run Torah achieved her dream of a gold medal.

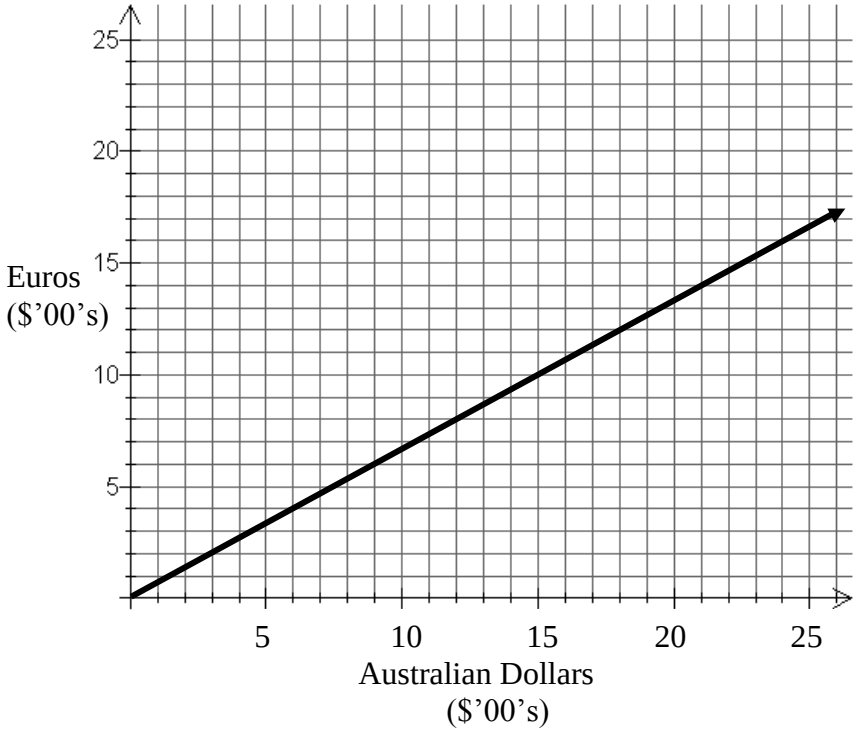
Her brother (and coach) clocked her time as 65 seconds over the 167 m course. What was her average speed in m/s? **1**

(iii) Torah's paents arrived on a surprise visit to watch their daughter compete. If their plane left Sydney $(34^\circ S, 151^\circ E)$ at 3:00 pm on Sunday and arrived in Vancouver $(49^\circ N, 123^\circ W)$ after a 23 hour flight, what time **and** day did they arrive in Vancouver? Use exact time difference for this question. **2**

Question 26 continues on page 12

Question 26 (continued)

(iv) Use the conversion graph below to calculate the number of Euros to which they were able to convert their spending money of A$1 500, **1**



(v) Torah's home town of Cooma is 222.24 km south of Sydney (34°S, 151°E). What is the latitude of Cooma? **2**
(Remember 1 nautical mile = 1.852 km)

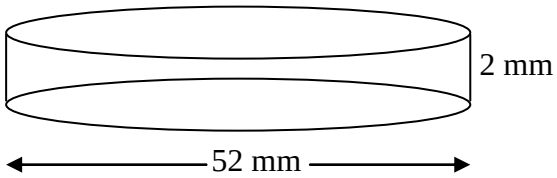
(vi) It was Torah's wonderful second run that gave her Australia's first gold medal at the Winter Olympics. Kevin Rudd, the Australian Prime Minister phoned Torah just after her gold medal victory was confirmed. Kevin has a mobile phone plan which charges a 30 cent connection fee and 25 cents/min. Represent Kevin's mobile phone information as a linear graph on the graph paper provided as a separate sheet on page 19, **clearly marking the scale on the axes**. **2**

Question 26 continues on page 13

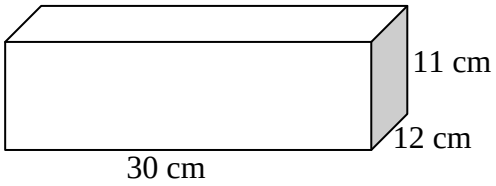
Question 26 (continued)

(vii) Calculate the volume of Torah Bright's gold medal **in cm^3.** **2**

NOT TO SCALE



(viii) The medals are made from gold ingots which have the shape and dimensions of a rectangular prism as shown. Calculate the volume of one ingot. **1**



(ix) How many gold medals can be made from one gold ingot when it is melted down? **1**

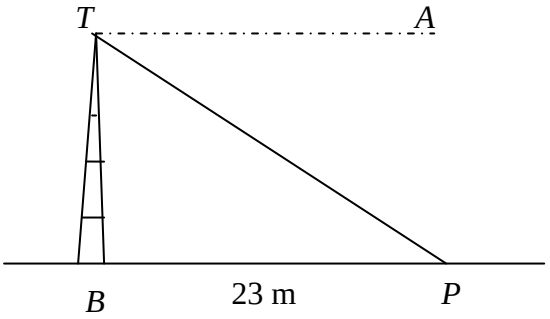
End of Question 26

Question 27 (13 Marks) **Use a separate booklet**

(a) Use your calculator to find $\tan 68^\circ$. Give your answer correct to three decimal places. **1**

(b) A yacht sails 30 km on a bearing of 045°, then turns and sails 30 km on a bearing of 135°, then turns and sails 30 km on a bearing of 225°. What is the bearing of the yacht from its starting point? **1**

(c)

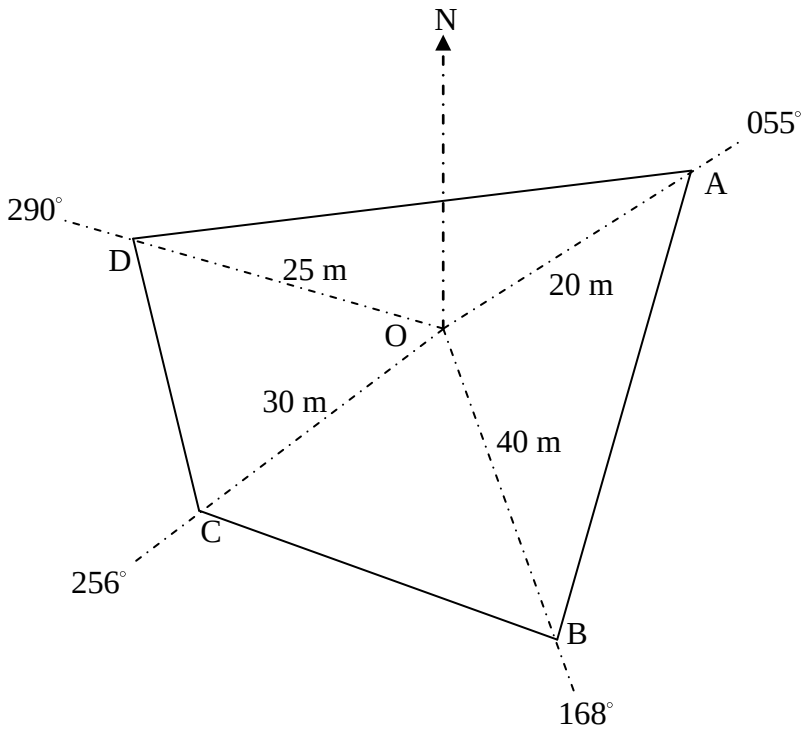


The angle of depression from the top of the tower (T) to the peg (P) is 40°. How high is the tower? Give your answer to 1 decimal place. **2**

Question 27 continues on page 15

Question 27 (continued)

(d) On an excursion, Year 12 General Mathematics students completed the radial compass survey shown below



(i) Find obtuse $\angle DOA$. **1**

(ii) Find the length of the side AD (correct to the nearest metre). **2**

(iii) Find the area of ΔCOB (correct to nearest whole number). **2**

(iv) What is the bearing of O from B? **1**

Question 27 continues on page 16

(e) Two trees on the same side of the river are 60m apart. A ranger standing next to one of the trees (F) sees an illegal camper (C) across the river on a bearing of 059°. He moves due east to the second tree (S) and sees that the camper is now on a bearing of 040°.

(i) Complete the diagram on the attachment on page 20 which shows this situation by calculating all necessary angles. Mark the angles on the diagram. **1**

(ii) Find the shorter distance between the camper and the ranger **2**

End of Question 27

Question 28 (13 Marks) Use a separate booklet

(a) Janice and Jeremiah made the following transactions recorded in February on their credit card statement

Date	**Transaction Details**	**Amount**
27 Jan	Opening Balance	$5 437.67
28 Jan	Payment – Thank You	-$4 215.00
30 Jan	Littlestore Caringal	$ 223.15
5 Feb	Tollgate Nth Ryde	$50.00
7 Feb	Archery Stores Castle Hill	$124.85
12 Feb	Gas Co Bathurst	$52.25
15 Feb	Telco Melbourne	$125.00
17 Feb	Financial Institutions Duty	$3.65
22 Feb	Interest	$17.42

(i) What is the opening balance? **1**

(ii) Calculate the closing balance. **1**

(iii) The minimum payment to be made is 5% of the closing balance. What is the minimum payment? **1**

(iv) When the balance is not paid by the due date, interest is charged at 16% p.a. What is the daily interest rate? **1**

(v) The statement is due for payment on 28th March but Janice and Jeremiah go on holidays and forget to pay their credit card account for 15 days. How much interest do they have to pay? **1**

Question 28 continues on page 18

Question 28 (continued)

(b) Bill and Jane borrowed $100 000 to buy a house. They are paying the loan off with monthly repayments at a reducible interest rate of 8% p.a.

Month	**Principal (*P*)**	**Interest (*I*)**	***P+I***	**Amount owing after Repayment (*P+I-R*)**
1	$100 000	$666.67	**A**	$99 766.67
2	$99 766.67	$665.11	$100 431.78	$99 531.78
3	$99 531.78	$663.55	$100 195.33	$99 295.33
4		**B**		**C**

(i) What is the value of **A**? **1**

(ii) Show how the monthly interest rate for the third month, $663.55 was obtained. **1**

(iii) What is the monthly repayment (*R*) for this loan? **1**

(iv) Why is the last value in a row the same as the first value in the next row? **1**

(v) Complete the row for the 4^{th} month by calculating the interest for the 4^{th} month **B** and the amount owing after the repayment **C.** **2**

(c) Susan applies for a loan from the bank. The loan is to be repaid monthly over 5 years. She is offered 7% p.a.flat rate **or** 8 % p.a. reducible. Decide which rate Susan should take by using the formula below giving an explanation of your answer. **2**

$$E = \frac{(1+r)^n - 1}{n}$$

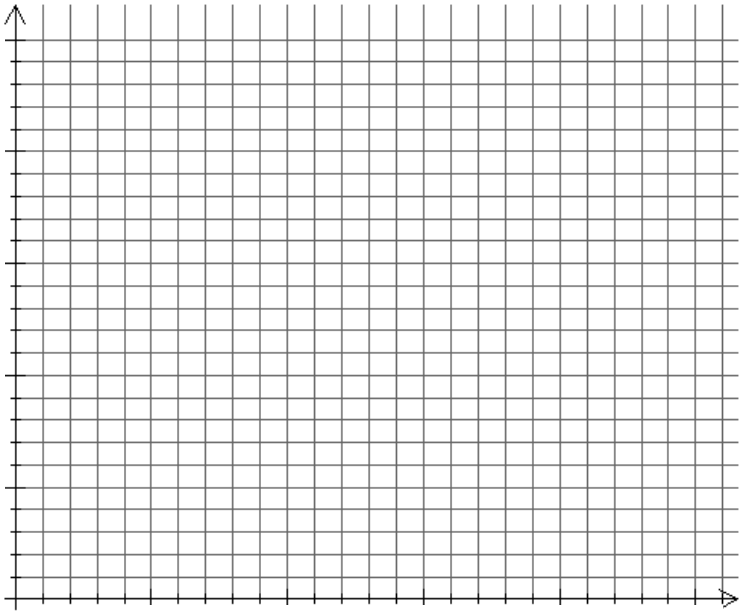
Where E = the effective **reducible** interest rate per payment period, as a decimal.
r = **flat** interest rate per payment period, as a decimal.
n = the number of repayment periods

End of Paper

Question 26 (a) (vi) **Marks**

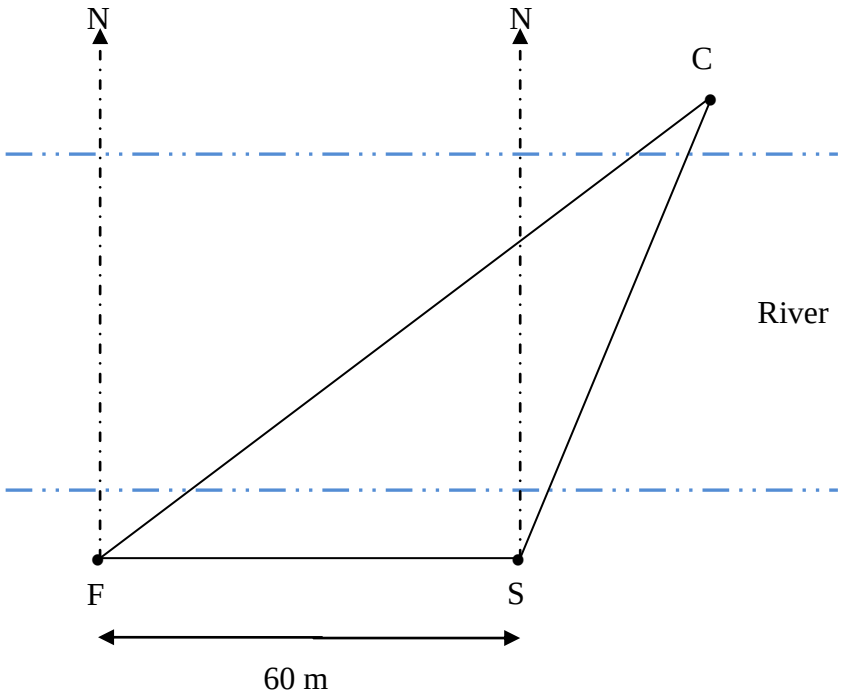
2

Kevin Rudd's Mobile Phone Charges



Question 27 (e) **Marks**

1



2010 Yr 12 General Mathematics Half Yearly Examination **SOLUTIONS**

1. A ○ B ○ C ○ D ●

2. A ○ B ○ C ● D ○

3. A ○ B ○ C ○ D ●

4. A ○ B ○ C ● D ○

5. A ○ B ○ C ○ D ●

6. A ○ B ○ C ● D ○

7. A ○ B ● C ○ D ○

8. A ○ B ○ C ● D ○

9. A ● B ○ C ○ D ○

10. A ○ B ● C ○ D ○

11. A ● B ○ C ○ D ○

12. A ○ B ○ C ● D ○

13. A ○ B ○ C ○ D ●

14. A ○ B ○ C ○ D ●

15. A ○ B ○ C ● D ○

16. A ● B ○ C ○ D ○

17. A ○ B ● C ○ D ○

18. A ○ B ○ C ● D ○

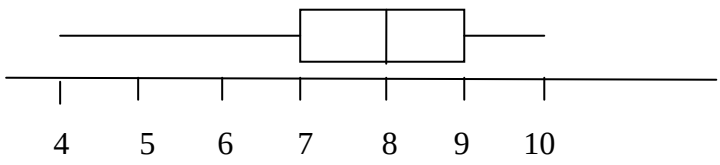
19. A ● B ○ C ○ D ○

20. A ● B ○ C ○ D ○

21. A ● B ○ C ○ D ○

22. A ○ B ○ C ○ D ●

Question 23 (13 Marks) **Marks**

(a)	(i)	$\$0.40 \times 3500 = \$1\,400$	**1**
	(ii)	$\frac{0.40}{26.20} \times 100 = 1.5267...\%$ $\approx 1.53\%$ (to 2 dec. pl)	**1**
	(iii)	$(\$26.20 - \$21.80) \times 3\,500 = \$15\,400$ [1] [1]	**2**
	(iv)	$\$28 \times 40 \times 52 = \$58\,240$ $\$58\,240 - (\$15 \times 52) = \$57\,460$ [1] $\$57\,460 + \$15\,400 + \$1400 = \$74\,260$ [1]	**2**
	(v)	$\$8.05 \times 370 = \$2978.50$	**1**
	(vi)	$\$2978.50 \times 12 \times 25 = \$893550.00$	**1**
	(vii)	$\$893\,550 - \$370\,000 = \$523\,550$	**1**
	(viii)	"Loan is paid off quicker" or "Less interest is paid over the period of the loan"	**1**
(b)	(i)	Min X = 4 Q = 7 Median = 8 Q3 = 9 Max X = 10 (When using Stats mode on calculator, scores go in List 1 and frequency in List 2 and you must change "set-up" to reflect this.)	**1**
	(ii)	 [1] Box [1] Whiskers	**2**

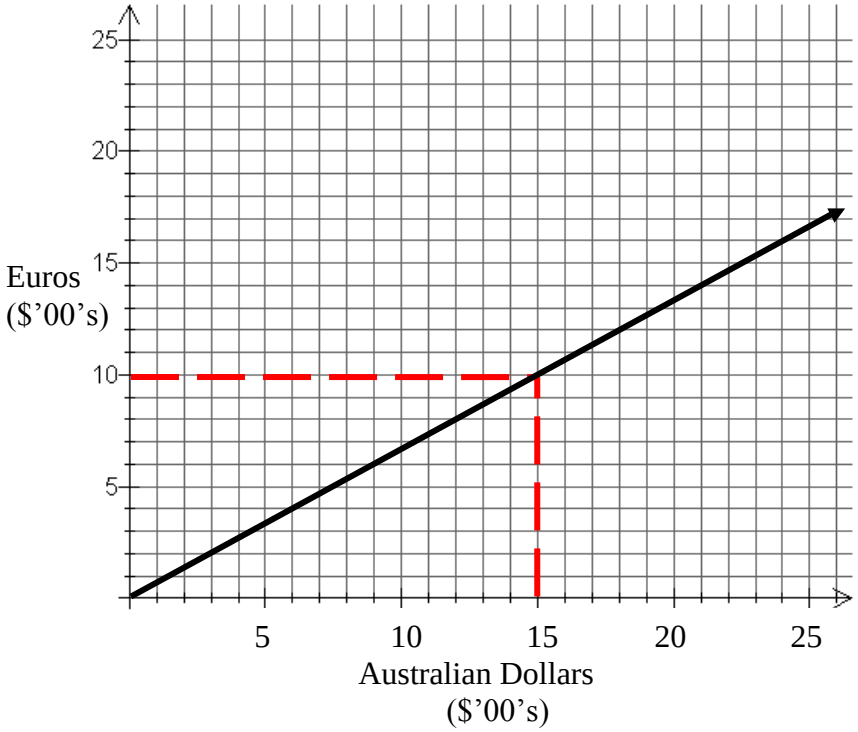
Question 24 (13 Marks) **Marks**

(a)	(i) $\frac{1}{13}$	**1**
	(ii) $\frac{1}{4}$	**1**
	(iii) $\frac{1}{52}$	**1**
	(iv) $\frac{3}{13}$	**1**
(b)	Total number of squares is 37, Red is $\frac{18}{37}$ or 48.6% which is < 50%, so there is a less than even chance of scoring red.	**1**
(c)	(i) $\frac{7}{25}\times 100\% = 28\%$	**1**
	(ii) $\frac{4}{25}$	**1**
	(iii) $1-\frac{4}{25}=\frac{21}{25}$	**1**
(d)	$20\times 20\times 20\times 20\times 20 = 3\,200\,000$	**1**
(e)	(i) ${}^{17}P_3 = 4080$ or $17\times 16\times 15 = 4080$	**1**
	(ii) $\frac{3\times 2\times 1}{{}^{17}P_3}=\frac{6}{4080}$ $=\frac{1}{680}$	**1**
	(iii) $\frac{1}{4080}$	**1**

Question 25 (13 Marks) **Marks**

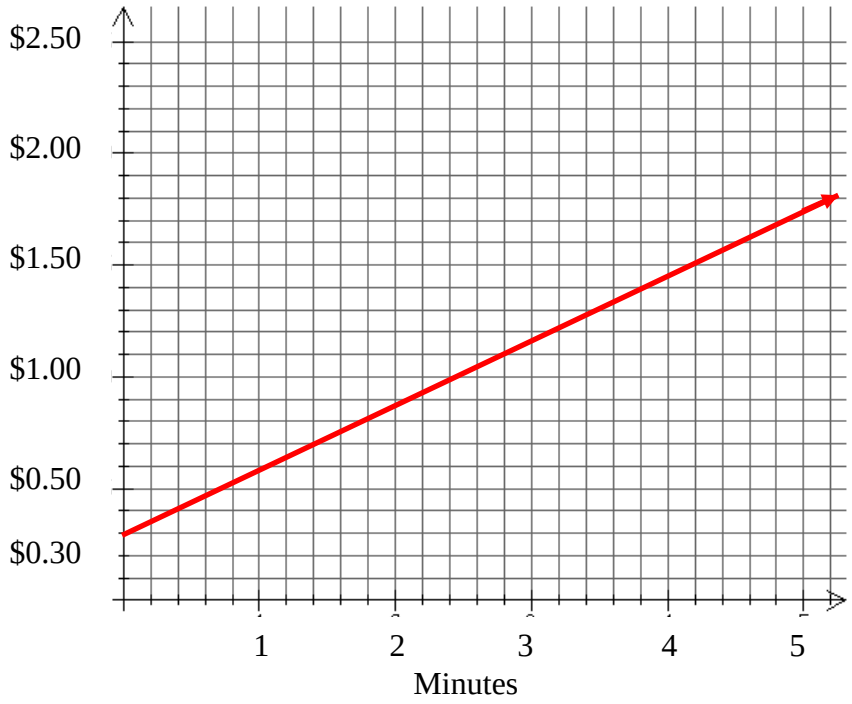
(a)	(i) \$1 500	**1**
	(ii) \$6 000	**1**
	(iii) \$11 100	**1**
	(iv) \$3 600	**1**
	(v) $\frac{3600}{6000}\times 100 \div 4 = 15\%$ [1] if use total amount not balance	**2**
(b)	(i) $2x+6=4x-8$ $14=2x$ $x=7$ [1]	**1**
	(ii) $\frac{x}{5}+\frac{7x}{10}=18$ $\frac{2x}{10}+\frac{7x}{10}=18$ $\frac{9x}{10}=18$ [1] $9x=180$ $x=20$ [1]	**2**
(c)	$54=2d^3$ $d^3=27$ [1] $d=3$ [1]	**2**
(d)	$k=4\pi t+\frac{2}{3}y$ $k-4\pi t=\frac{2}{3}y$ $y=\frac{3(k-4\pi t)}{2}$ or $y=\frac{3k-12\pi t}{2}$ [1] working some way towards the answer correctly [2] either final answer	**2**

Question 26 (13 Marks) **Marks**

(a)	(i) Vancouver is 18 hours behind so 1:30 pm Monday	**1**
	(ii) $167 \div 65 = 2.57 \text{m/s}$ [1]	**1**
	(iii) $151^\circ + 123^\circ = 274^\circ$ $274^\circ \div 15 = 18\text{h}16\text{min behind}$ $3{:}00\,\text{pm Sunday} - 18\text{h}16\text{min} + 23\text{ hours flight} = 7{:}44\,\text{pm Sunday}$ [1] Time [1] Day	**2**
	(iv)  $10 \times 100 = \$1\,000\,\text{Euros}$	**1**
	(v) $222.24 \div 1.852 = 120\,\text{M}$ [1] $120\text{M} \div 60 = 2^\circ$ $34^\circ\text{S} + 2^\circ = 36^\circ\text{S}$ [1] Cooma is 36°S latitude	**2**

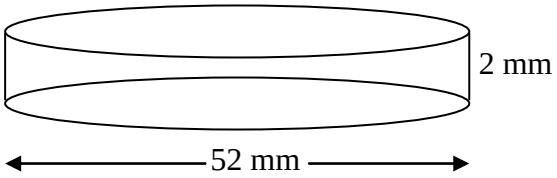
Question 26 continued **Marks**

(vi) **2**



[1] y-intercept at $0.30
[1] Gradient correct at $0.50/min

(vi) **2**



Radius = 2.6 cm
Height = 0.2 cm

$V = \pi r^2 h$

$= \pi \times 2.6^2 \times 0.2$ [1]

$= 4.2474....$

$\approx 4.25\,\text{cm}^3$ [1]

(vii) **1**

$V = lbh$

$= 30 \times 12 \times 11$

$= 3\,960\ cm^3$

(viii) **1**

$3\,960 \div 4.2474... = 932.32....$

Only 932 medals can be made.

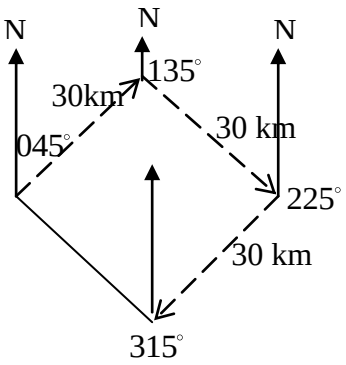
Question 27 (13 Marks) **Marks**

(a) **1**

$\tan 68^\circ = 2.47508...$

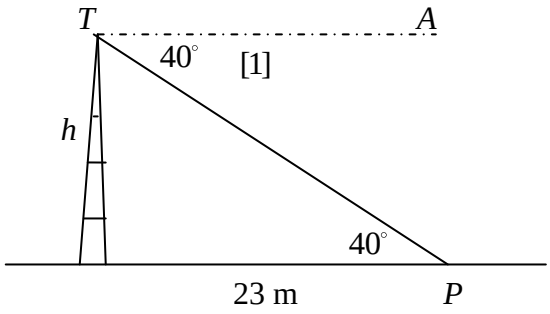
≈ 2.475

(b) **1**



Final bearing is 135°

(c) **2**



$\frac{h}{23} = \tan 40^\circ$

$h = 23 \times \tan 40^\circ$

$= 19.29929...$ [1]

$\approx 19.3\text{m}$

[1] for correct angle, [1] for correct answer without rounding.

(d) (i) $360^\circ - 290^\circ + 55^\circ = 125^\circ$ **1**

(ii)

$c^2 = a^2 + b^2 - 2ab\cos C$

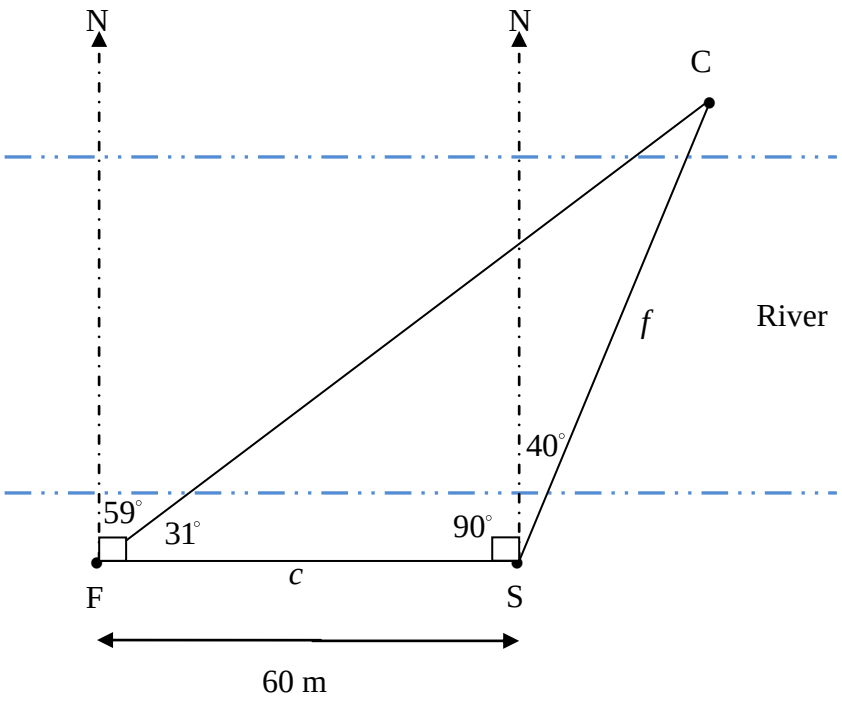
$= 25^2 + 20^2 - 2 \times 25 \times 20 \times \cos 125^\circ$ [1]

$= 1598.5764...$

$c = 39.9822....$ [1]

$= 40\text{m}$

Question 27 continued **Marks**

	(iii) $256^\circ - 168^\circ = 88^\circ$ [1] $A = \frac{1}{2}ab\sin C$ $= \frac{1}{2} \times 30 \times 40 \times \sin 88^\circ$ $= 599.6344...$ $= 600 \text{ m}^2$ [1]	**2**
	(iv) $180^\circ + 168^\circ = 348^\circ$	**1**
(e)	(i)  [1] both given angels must be marked	**1**
	(ii) $90^\circ - 59^\circ = 31^\circ, 90^\circ + 40^\circ = 130^\circ, 180^\circ - (130^\circ + 31^\circ) = 19^\circ$ [1] $\frac{f}{\sin F} = \frac{c}{\sin C}$ $\frac{f}{\sin 31^\circ} = \frac{60}{\sin 19^\circ}$ $f = \frac{60}{\sin 19^\circ} \times \sin 31^\circ$ [1] $f = 94.9180..$ $\approx 95 \text{m} \left(\text{to nearest m}\right)$ [1] calculating two unknown angles, [1] correct use of Sine Rule	**2**

Question 28 (13 Marks) **Marks**

(a)

(i) \$5 437.67 **1**

(ii) \$1818.99 **1**

(iii) \$90.95 **1**

(iv) 0.04383...% daily (must have % sign) **1**

(v) **1**

$$I = \Pr n$$
$$= \$1818.99 \times \left(\frac{16}{100} \div 365 \right) \times 15$$
$$= \$11.966465...$$
$$= \$11.97$$

(b)

Month	**Principal (*P*)**	**Interest (*I*)**	***P+I***	**Amount owing after Repayment (*P+I-R*)**
1	\$100 000	\$666.67	**A**	\$99 766.67
2	\$99 766.67	\$665.11	\$100 431.78	\$99 531.78
3	\$99 531.78	\$663.55	\$100 195.33	\$99 295.33
4		**B**		**C**

(i) **A** = \$100 666.67 **1**

(ii)

$$I = \Pr n$$
$$I = \$99\,531.78 \times \left(\frac{8}{100} \div 12 \right) \times 1$$
$$= \$663.5452$$
$$\approx \$663.55 \text{ (correct to 1 dec. pl)}$$ **1**

(iii) \$900 (subtract last two columns) **1**

(iv) Because the amount owing after one month becomes the new Principal for the next month. **1**

(v)

$$I = \Pr n$$
$$= 99295.33 \times \left(\frac{8}{100} \div 12 \right) \times 1$$
$$= 661.968...$$
$$B \approx \$661.97$$ **1**

(vi)

$$\$661.97 + \$99\,295.33 - \$900 = \$99\,057.2989...$$
$$C \approx \$99\,057.30$$ **1**

Question 28 continued **Marks**

(c)	$E = \dfrac{(1+r)^n - 1}{n}$ $r = \dfrac{7}{100} \div 12$ $= 0.0058333333...$ $n = 12 \times 5$ $= 60$ $E = \dfrac{(1+0.00583333..)^{60} - 1}{60}$ $= 0.0069604....$ $0.0069604.... \times 100 \times 12 = 8.3525...\%$p.a. [1] The 7% p.a. flat rate is effectively an 8.35% p.a. reducible rate which is more than the 8% p.a. reducible rate she was offered so she should take the 8% p.a. reducible rate offered by the bank. [1] (for explanation)	**2**