Student Number .....

Barker College

2010
TRIAL
HIGHER SCHOOL
CERTIFICATE

General Mathematics

ANSWER SHEET

Staff Involved: **THURSDAY 5TH AUGUST**

- **JML***
- **VAB***
- **JWH**
- **BJB**
- **TZR**
- **LJP**
- **LMD**
- **GDH**
- **AJD**

155 copies

Section I – Multiple Choice

Choose the best response and fill in the response oval completely

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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)

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THURSDAY 5TH AUGUST

155 copies

General Instructions

- Working time – 2 hours 30 minutes
- Write using blue or black pen
- Make sure your Barker Student Number is on ALL answer pages handed in
- Approved calculators, graphic calculators and templates may be used
- Marks may be deducted for careless or poorly arranged work
- A Mathematical Formulae Sheet on pages 25-26 is provided for your general use

Total marks – 100

Section I Pages 4 – 11

22 marks

- Attempt Questions 1 – 22
- Allow about 30 minutes for this section
- Answer this section on the Answer Sheet provided

Section II Pages 12 – 23

78 marks

- Attempt Questions 23 – 28
- Show ALL necessary working
- Allow approximately 2 hours for this section
- Answer this section on the separate lined paper provided

SECTION I

22 marks

Attempt Questions 1 – 22

Use the multiple-choice answer sheet

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

Sample 2 + 4 = (A) 2 (B) 6 (C) 8 (D) 9

(A) ⬭ (B) ⬬ (C) ⬭ (D) ⬭

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

(A) ⬬ (B) ⬬ (C) ⬭ (D) ⬭

If you change your mind and have crossed out what you consider to be the correct answer, then indicate this by writing the word *correct* and drawing an arrow as follows.

correct

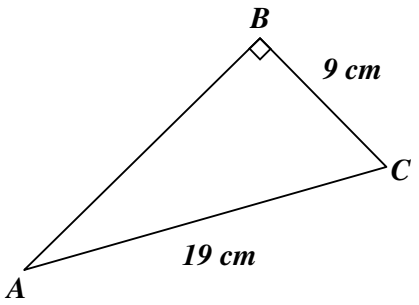
(A) ⬬ (B) ⬬ (C) ⬭ (D) ⬭

---

1. The median of the set of scores { 17, 8, 14, 9, 11, 19, 19, 5, 15 } is:

(A) 11 (B) 14 (C) 15 (D) 13

2.



For the right angle triangle ABC above, the length of side *AB* is closest to:

(A) 17 cm (B) 10 cm (C) 21 cm (D) 14 cm

3. An electrician's bill for some repair work was $159.50 including 10% GST.

The amount of GST charged was:

(A) $15.95 (B) $10.00 (C) $14.50 (D) $145.00

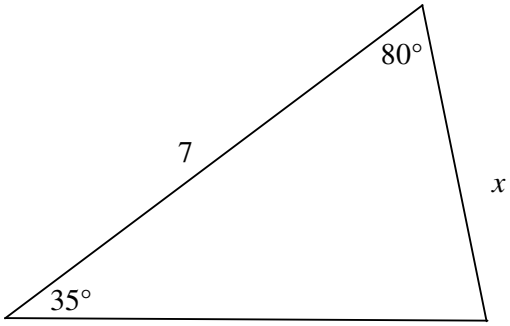
4. Use the formula $v = \sqrt{u^2 + 2as}$ to find the approximate value of v given that $u = 5$, $a = 2.2$, and $s = 10$.

(A) 6.63 (B) 7 (C) 8.31 (D) 31.6

5. Which of the following is an example of discrete quantitative data?

(A) the height of Yr 12 students
(B) the hair colour of the students of a Year 12 Maths class
(C) the time taken to complete an assignment
(D) the number of cars stolen each year

6.



NOT TO SCALE

Which of the following equations should be used to find the value of x in the triangle above?

(A) $7 \sin 35^o$

(B) $\dfrac{7 \sin 35^o}{\sin 65^o}$

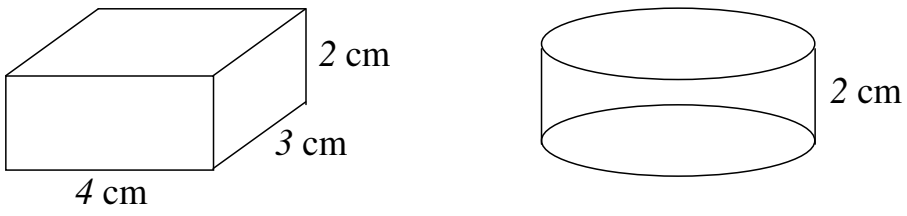
(C) $\dfrac{7 \sin 35^o}{\sin 80^o}$

(D) $\dfrac{7 \sin 65^o}{\sin 35^o}$

7. The fishing authorities are concerned about the number of fish in a certain lake. To investigate this they use the "capture-recapture" method. They capture *70* fish, tag them and release them. The following month they return and take a sample of *20* fish from the lake, noting that *3* of these are tagged. Estimate the number of fish in the lake.

(A) 90 (B) 210 (C) 470 (D) 4 200

8.

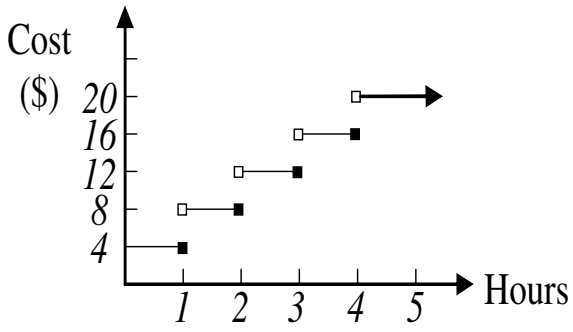


NOT TO SCALE

A block of chocolate in the shape of a rectangular prism *4* cm by *3* cm by *2* cm is melted down and poured into a cylindrical mould of height *2* cm. The volume of a cylinder = $\pi r^2 h$. To exactly fill the cylinder, the radius would be closest to:

(A) 1.9 cm (B) 2.0 cm (C) 3.8 cm (D) 3.9 cm

9. The graph shows parking at Cinema Parking Station is charged at *$4* per hour, or part thereof, with a maximum of *$20* per day.



Tony parks for $3\frac{1}{2}$ hours. His parking cost will be:

(A) \$4 (B) \$12 (C) \$16 (D) \$20

10. A letter is chosen at random from the letters of the word "*PROBABILITY*". Find the probability that the letter chosen is the letter *I*.

(A) $\frac{1}{11}$ (B) $\frac{2}{11}$ (C) $\frac{1}{9}$ (D) $\frac{2}{9}$

11. Warren repays a loan of \$3 400, plus simple interest, over 2 years, paying monthly instalments of \$185. The total interest Warren pays on the loan is:

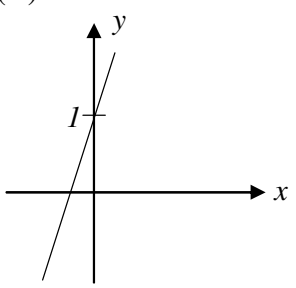
(A) \$4 440 (B) \$2 220 (C) \$1 180 (D) \$1 040

12. A large inflatable golf ball is used to advertise a new golf store. The inflated golf ball is a sphere with radius 1.4 m. The volume of the inflatable golf ball is closest to:

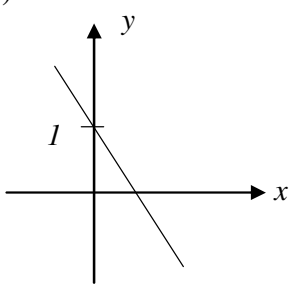
(A) 6.16 m^3 (B) 11.49 m^3 (C) 24.63 m^3 (D) 34.48 m^3

13. Which one of the following could be the graph of $y = 3x + 1$?

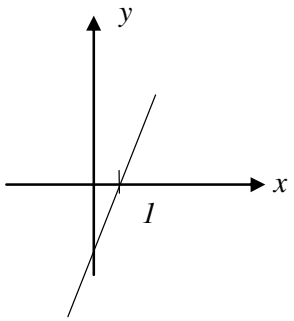
(A)



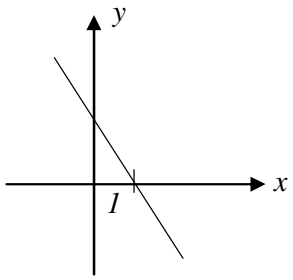
(B)



(C)



(D)



14. The following table shows the income tax rate for Australian residents for the 2009-10 financial year.

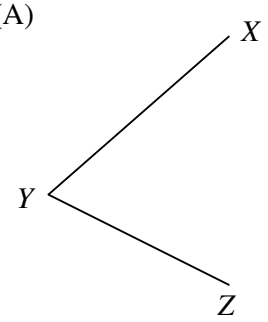
Taxable income	*Tax on this income*
0 – $6,000	Nil
$6,001 – $35,000	15c for each $1 over $6,000
$35,001 – $80,000	$4,350 plus 30c for each $1 over $35,000
$80,001 – $180,000	$17,850 plus 38c for each $1 over $80,000
$180,001 and over	$55,850 plus 45c for each $1 over $180,000

At the end of the last financial year Susan was required to pay income tax of $23 760.90
Her taxable income was:

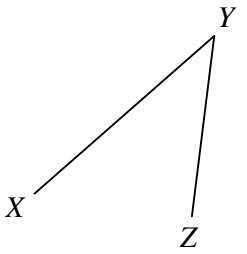
(A) $2 664 (B) $15 555 (C) $79 203 (D) $95 555

15. A bushwalker walks to Y from X on a bearing of $124°$ and then changes direction and walks to Z on a bearing of $223°$. Which of the following best represents this information?

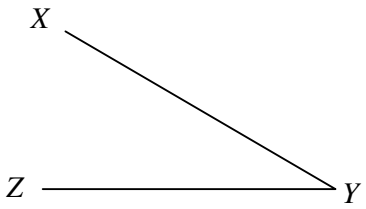
(A)



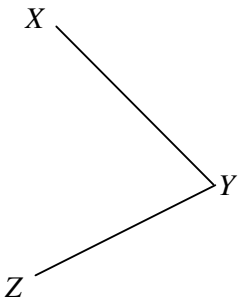
(B)



(C)



(D)



16. Solve the equation $\frac{p-3}{3} - \frac{p-2}{4} = 1$

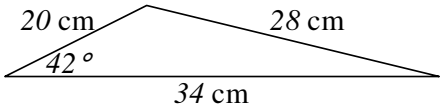
The solution is:

(A) $p = 7$ (B) $p = 13$ (C) $p = 18$ (D) $p = 30$

17. Calculate the present value of an annuity in which *$1200* is invested at the end of every year for ten years and interest is paid annually at a rate of *5%* per annum. (Answer to the nearest dollar.)

(A) \$30 654 (B) \$15 093 (C) \$9 266 (D) \$1 922

18. The area of the triangle drawn is given by:



NOT TO SCALE

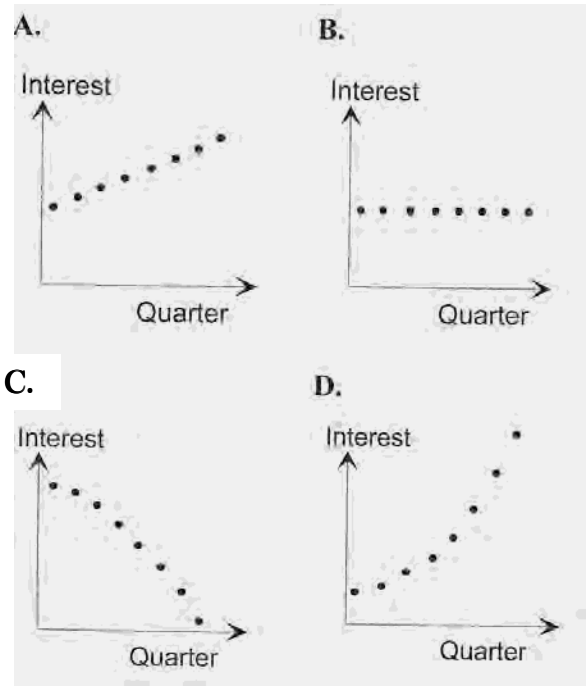
(A) $\frac{1}{2} \times 34 \times 28$

(B) $\frac{1}{2} \times 34 \times 28 \times \sin 42^\circ$

(C) $\frac{1}{2} \times 20 \times 28 \times \sin 42^\circ$

(D) $\frac{1}{2} \times 20 \times 34 \times \sin 42^\circ$

19. $10 000 is invested in an account earning 6.8% p.a. interest compounding quarterly. Which one of the following graphs best illustrates the amount of **interest earned** by this investment each quarter for two years?

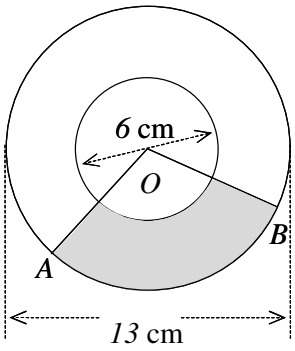


20. At Sunshine Resort, the probability that it will rain on any particular day in January is *0·1*. Gloria will spend *3* days at the Sunshine Resort in January *2001*. What is the probability that it will rain on at least one of those *3* days?

(A) 0.001 (B) 0.271 (C) 0.3 (D) 0.729

21.

NOT TO SCALE



Given $\angle AOB = 80°$, calculate the area of the shaded region.

(A) $4{\cdot}9\ \text{cm}^2$ (B) $23.2\ \text{cm}^2$ (C) $26.1\ \text{cm}^2$ (D) $92{\cdot}9\ \text{cm}^2$

22. Two basketball teams are comparing their most recent games. They prepared the following stem-and-leaf plot of their scores.

Team B		**Team A**
7 6 5 1 1 1	3	5 6 8 9
6 5 4 0	4	0 2 4 4 7
3 2 1 0	5	1 1 5 9
0	6	0 4

Which of the following statements is **not** true?

(A) Both sets of data have the same number of scores.
(B) Team B has the lowest score
(C) Both sets of data have the same median.
(D) Both sets of data have the same Q_1

End of Section I

Section II
78 marks. Attempt Questions 23 – 28
Allow about 2 hours for this section
All necessary working should be shown in every question.

Answer each question on a separate A4 sheet of paper.

Marks

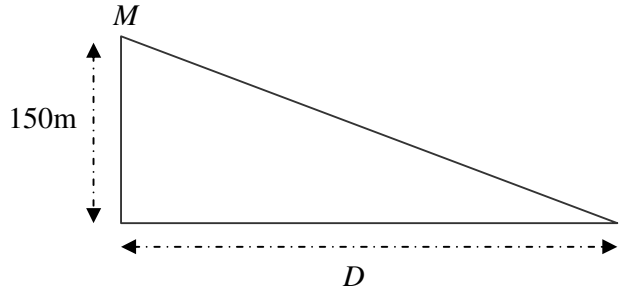
Question 23 (13 marks) **[START A NEW PAGE]**

(a) Make A the subject of $Q = 5m(B - A)$ **2**

(b) Solve the equation $\frac{x+3}{2} - 6 = 5x$ **2**

(c) Simplify fully $3x(2x-5) - 6x(x+2)$ **2**

(d) Meagan (M) was standing at the top of a 150m high cliff when she saw a ship appear on the horizon. (H) **2**



The approximate distance, **in kilometres**, D, to the visible horizon when seen by a person standing at height h **metres** above sea level is given by $D = 5\sqrt{\frac{h}{2}}$.

Calculate how far Meagan could see to the horizon from the top of the cliff. Answer correct to the nearest kilometre.

(e) The exchange rate for a euro conversion was \$ 1 Australian = 0.67 euros

(i) How many euros will \$800 Australian dollars buy? **1**

(ii) What is the value of 1 000 euros in Australian dollars? **1**

(f) Lance is a professional cyclist who can push his pedals around 92 times (rotations) every minute on an uphill stretch of road.

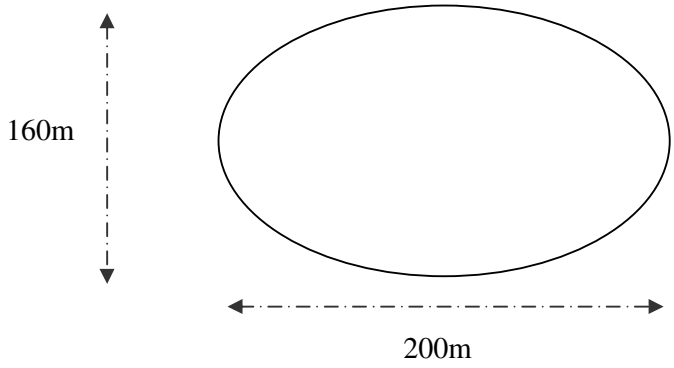
(i) How many rotations per second is this? **1**

(ii) Each rotation moves the bike 3.8 m. What is his speed in km / h ? **2**

End of Question 23

Question 24 (13 marks) **[START A NEW PAGE]** **Marks**

(a) A Sports Club's cricket oval is in the shape of an ellipse.

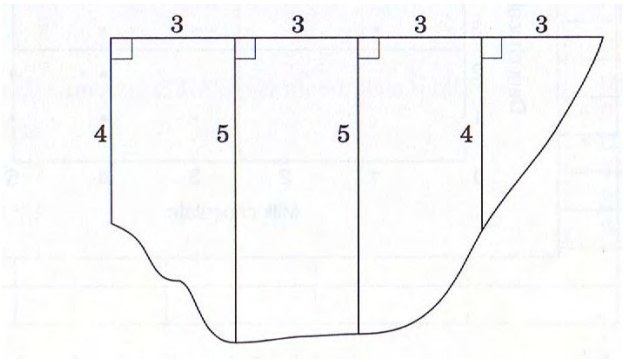


NOT TO SCALE

(i) Calculate the area of the oval. Give answer correct to one decimal place. **2**

(ii) At the end of the season the greenkeeper is going to spread fertiliser over the oval.
If one bag of fertilizer covers $150\,m^2$, calculate how many bags of fertilizer the greenkeeper will need to purchase. **1**

(b) A river has a cross section as shown below, with measurements in metres.



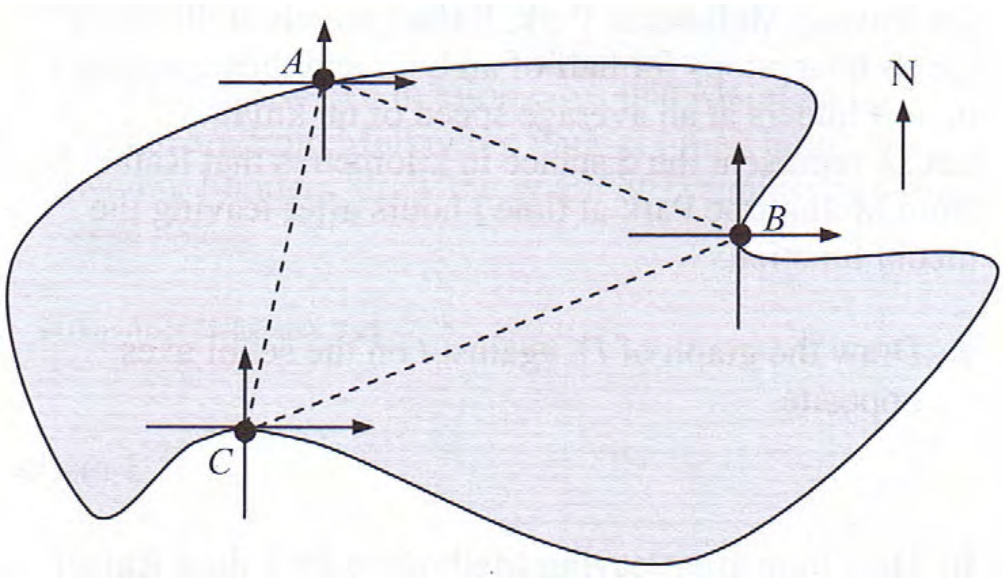
NOT TO SCALE

Calculate the approximate area of the cross-section by using Simpson's rule twice. **3**

Question 24 continues on page 14

Question 24 (continued) **Marks**

(c) On a school camp a group of students need to navigate around a small island as shown.



The students start a point A and walk for 5km to point B on a bearing of $120^{o}T$. Then from point B they walk 8 km to point C on a bearing of $260^{o}T$ before returning directly from point C to point A.

(i) Make a copy of triangle ABC and mark in all of the above distances and bearings. **1**

(ii) Clearly show on your diagram why angle $\angle ABC$ is 40^{o}. **1**

(iii) Calculate the distance from C to A. **2**
Give answer correct to 2 decimal places.

(iv) Calculate $\angle BCA$ to the nearest degree and hence state the bearing of A from C. **3**

End of Question 24

Question 25 (13 marks) **[START A NEW PAGE]** **Marks**

(a) Brad wants to buy a coffee machine for his café. Crazy Bill's Discount Store normally sells coffee machines for $3450, but they have a special discounted price of $3100 for this week.

What is the **percentage discount**? Write your answer correct to one decimal place. **2**

(b) Brad buys the machine for the price of $3100. The terms of the sale are $200 deposit and $275 per month for 12 months.

(i) What is the total cost of the machine on these terms? **1**

(ii) Calculate the annual flat rate of interest charged on these terms, correct to the nearest whole number. **3**

(c) Robert will depreciate his $900 fax machine for taxation purposes. He considers two methods of depreciation.

(i) Using the **flat rate depreciation method** the fax machine will be valued at $300 after five years.

Calculate the annual depreciation in dollars. **1**

(ii) Alternatively, Robert could use a different method called **unit cost depreciation.** This means that the **original value** of the fax machine is reduced by 46 cents for each fax sent.

Determine the value of the fax machine **after five years,** if Robert sends 250 faxes per year. **1**

(d) An amount was increased by 40%. The resulting amount was then increased by 30%. Express the total increase as a single percentage. **1**

Question 25 continues on page 16

Question 25 (continued) **Marks**

(e) Rhonda's credit union bank statement looked like this in June 2010.

Date	Particulars	Deposits	Withdrawals	Balance
01 July 2009	Brought Forward			2 400.00
15 Dec 2009	Deposit	1 200.00		3 600.00
02 Feb 2010	ATM Withdrawal		**A**	3 000.00
14 May 2010	Interest	85.50		**B**
20 June 2010	ATM Withdrawal		450.00	2 635.50

(i) Calculate the value of **A** - the amount withdrawn on 2 February 2010 **1**

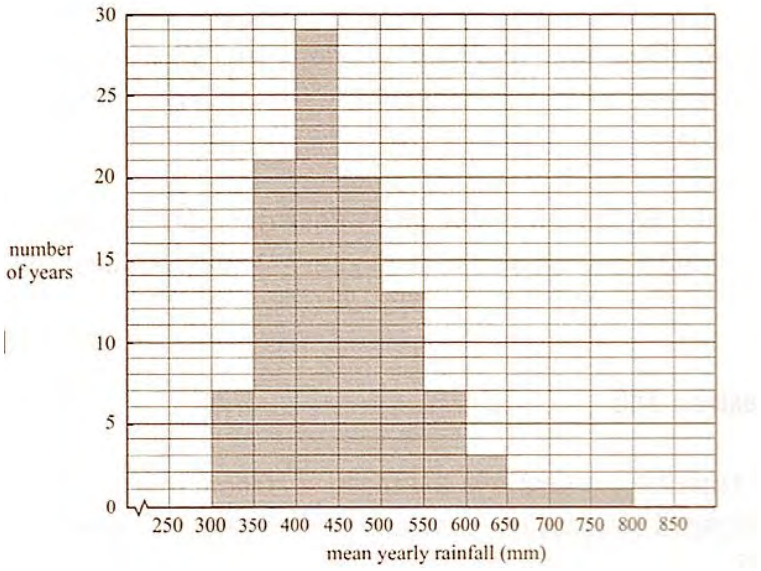
(ii) Calculate the value of **B** – the account balance for 14 May 2010 **1**

(iii) Interest on this account was paid at a rate of 0.3% per month, based on the minimum monthly balance.
How much interest did Rhonda earn for the month of December 2009? **2**

End of Question 25

Question 26 (13 marks) **[START A NEW PAGE]** **Marks**

(a) The histogram below shows the distribution of mean yearly rainfall (in mm) for Australia over 103 years.



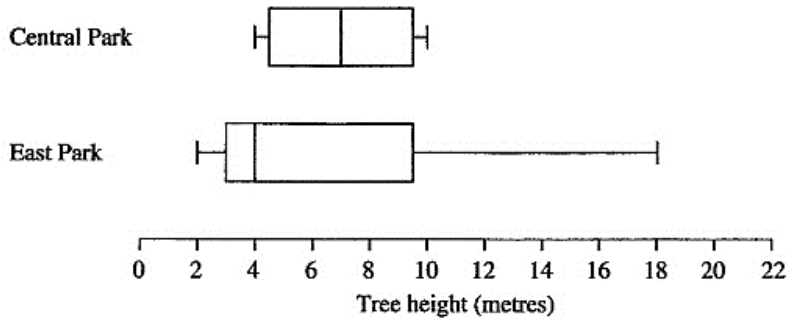
(i) Describe the shape of the histogram. **2**

(ii) Determine the number of years in which the mean yearly rainfall was more than 500mm. **1**

(iii) Determine the percentage of years in which the mean yearly rainfall was between 500mm and 600mm. (Give your answer correct to one decimal place.) **1**

(b) Mike and his geography class went to two large city parks and measured the heights of the trees in metres.

In Central Park there were 25 trees. In East Park there were 27 trees. The data sets were displayed in two box-and-whisker plots.



(i) In which park is the lowest tree, and how high is it? **1**

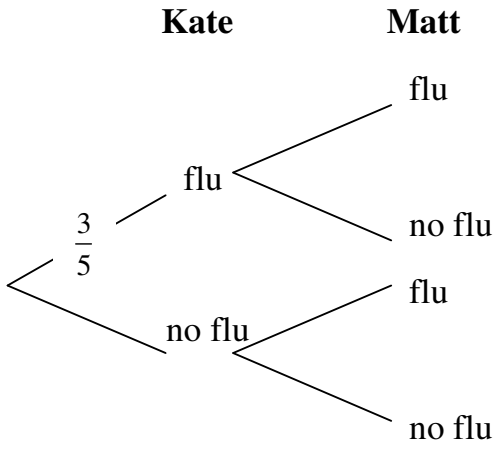
(ii) Compare and contrast the two data sets by determining and commenting on, one measure of centre and one measure of spread for each graph. **4**

Question 26 continued on page 18

(c) In Hornsby, the probability of a person catching the flu next winter is $\frac{3}{5}$.

(i) What is the probability that a person selected at random in Hornsby will **not** catch flu next winter? **1**

(ii) Kate and Matt live in Hornsby. Copy and complete this tree diagram, writing in the 5 missing probabilities, to show the probabilities of them catching the flu next winter. **1**



(iii) What is the probability that next winter Matt will catch the flu and Kate will not? **1**

(iv) Calculate the probability that at most one of them will catch the flu next winter. **1**

End of Question 26

Marks

Question 27 (13 marks) **[START A NEW PAGE]**

(a) Spark plugs are used in petrol motors. To produce a spark, there must be a small gap, *d* mm wide, in the top of the spark plug.

The efficiency rating, E, of 'Strong Motor' spark plugs can be determined using the formula $E = 360d\,(1-d)$, where d is the gap in millimetres, and *d* is restricted to values between 0 to 1.

(i)

d	0	0.2	0.4	0.5	0.6	0.8	1
E	0	57.6	86.4		86.4		0

Calculate the two missing values of *E*. **Record the values in your answer booklet**. **2**

(ii) On the graph paper, at the end of the paper, sketch the graph of the efficiency rating E for the values of d given in the table. **2**
Attach this page to your answer page/s for this question.

(iii) Which of the variables, d or E is the dependent variable? **1**
Give a reason for your answer.

(iv) What size gap produces the highest efficiency rating? **1**

(v) For acceptable motor performance the spark plug efficiency needs to be 65 or greater. Use your graph to estimate the widest spark plug gap width which will produce acceptable motor performance. **1**

(vi) Why do you think the gap widths in the algebraic model $E = 360d\,(1-d)$ are restricted to values from 0 to 1? **1**

Question 27 continued on page 20

Question 27 (continued) **Marks**

(b) A large number of people were tested for AIDS. The test is not always accurate.

	Test Positive	Test Negative	Total
Patients with AIDS	*977*	*23*	*1000*
Patients without AIDS	*73 926*	*925 074*	*999 000*
Totals	*74 903*	*925 097*	*1 000 000*

(i) How many people were tested? **1**

(ii) For how many people were the test results inaccurate? **1**

(iii) What percentage of the test results claimed to detect the presence of AIDS? **1**

(iv) One person is selected at random from the group that the test indicated had AIDS. What is the probability that this person actually had the disease? **2**

End of Question 27

Question 28 (13 marks) **[START A NEW PAGE]** **Marks**

(a) Ray has borrowed \$70 000 at an interest rate of 6.24% per annum compounded monthly. The repayments have been set at \$680 per month.

The loan balance sheet shows the interest charged and the balance owing for the first month.

Month	*Principal (at start of month)*	*Monthly interest*	*Monthly repayment*	*Balance (at end of month)*
1	\$70 000	\$70 000 x 0.0052 = \$364	\$680	\$69 684
2	\$69 684	***C***	\$680	***D***

(i) Write a calculation to show why 0.0052 is used to calculate the monthly interest. **1**

(ii) Calculate the missing amount at ***C*** . **1**

(iii) Calculate the missing amount at ***D.*** **1**

(iv) Ray would like to calculate the number of months, n ,it will take to repay the loan fully. He uses a 'guess-and-check' method to estimate n in the following equation:

$$\$680 \times \left\{ \frac{(1.0052)^n - 1}{0.0052 \times (1.0052)^n} \right\} = \$70\,000$$

Here is his working.

Try $n = 200$:

$$\$680 \times \left\{ \frac{(1.0052)^{200} - 1}{0.0052 \times (1.0052)^{200}} \right\} \approx \$84\,424$$

Hence $n = 200$ is too big

α) Ray's next guess is $n = 120$.
Show Ray's working for this value of n , including the calculation and the conclusion. **2**

β) State a reasonable value for n for the next guess. **1**

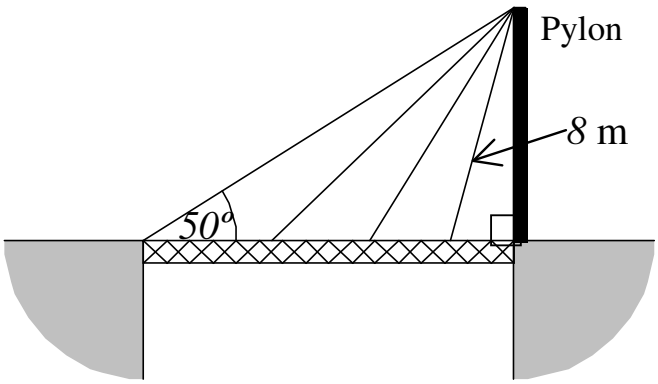
Question 28 continued on page 22

Question 28 (continued) **Marks**

(b) A car is purchased for $57 000.

Use the declining balance method to calculate the salvage value of the car after 4 years at the depreciation rate of 15% p.a. **2**

(c) A horizontal pedestrian bridge is supported by four cables attached to the top of a vertical pylon as illustrated below.



The longest cable is inclined to the bridge at $50°$, and the length of the shortest cable is 8 metres. The angle between the shortest cable and the pylon is equal to each of the other angles between adjacent cables.

(i) Show that the angle between the shortest cable and the pylon is $10°$. **1**

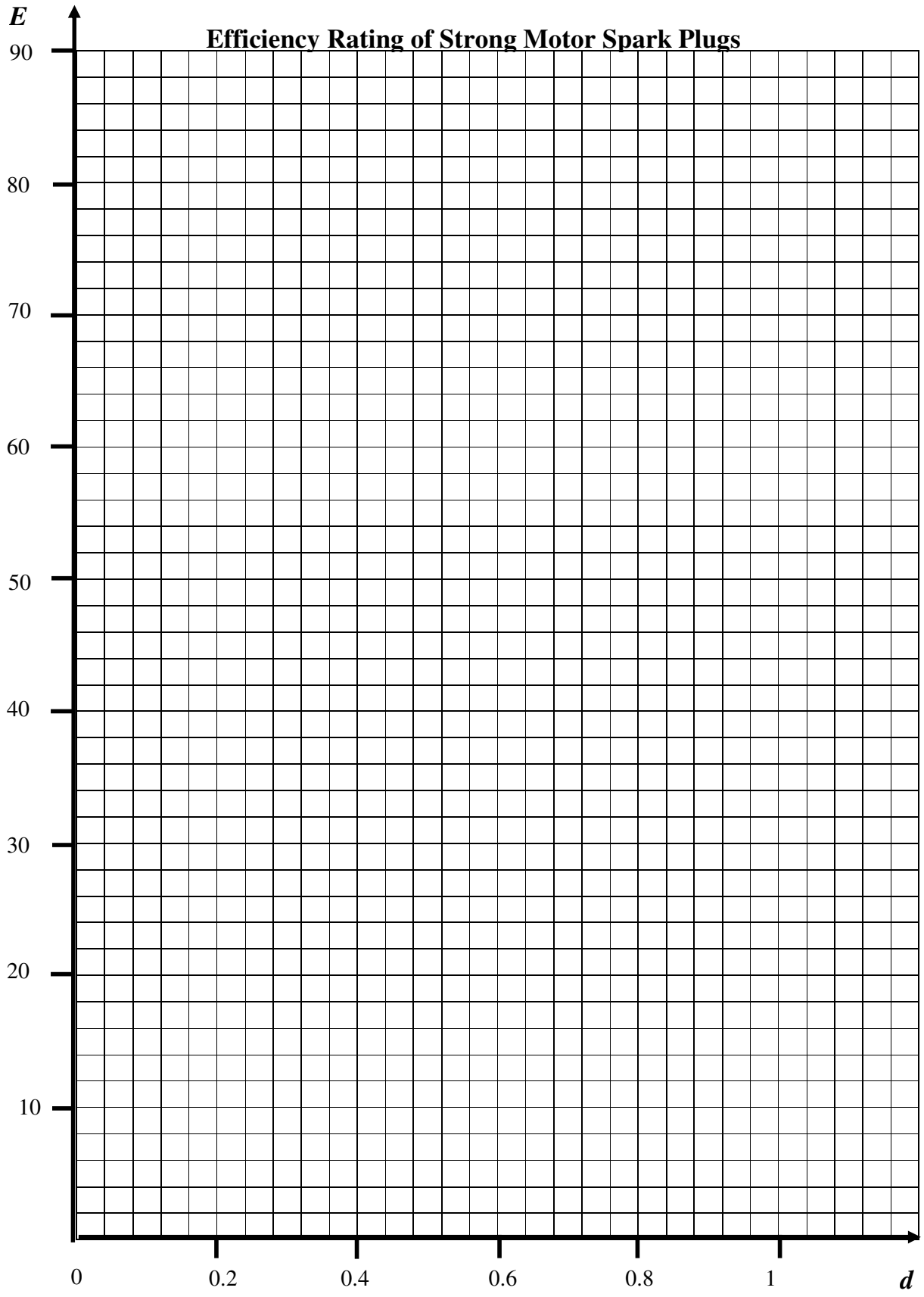
(ii) Find the height of the pylon. **2**
Give your answer in metres, correct to one decimal place.

(iii) Find the length of the longest cable. **2**

End of Question 28

End of Paper

Graph paper for Question 27 **Student Number** .....



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Formulae Sheet

Area of an annulus

$A = \pi\left(R^2 - r^2\right)$

R = radius of outer circle

r = radius of inner circle

Area of an ellipse

$A = \pi ab$

a = length of semi-major axis

b = length of semi-minor axis

Area of a sector

$A = \dfrac{\theta}{360}\pi r^2$

θ = number of degrees in central angle

Arc length of a circle

$l = \dfrac{\theta}{360}2\pi r$

θ = number of degrees in central angle

Simpson's rule for area approximation

$A \approx \dfrac{h}{3}\left(d_f + 4d_m + d_l\right)$

h = distance between successive measurements

d_f = first measurement

d_m = middle measurement

d_l = last measurement

Surface area

Sphere $A = 4\pi r^2$

Closed Cylinder $A = 2\pi rh + 2\pi r^2$

r = radius

h = perpendicular height

Volume

Cone $V = \dfrac{1}{3}\pi r^2 h$

Cylinder $V = \pi r^2 h$

Pyramid $V = \dfrac{1}{3}Ah$

Sphere $V = \dfrac{4}{3}\pi r^3$

r = radius

h = perpendicular height

A = area of base

Sine rule

$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Area of a triangle

$A = \dfrac{1}{2}ab\sin C$

Cosine rule

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

or

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

Simple interest

$I = Prn$

P = initial quantity

r = percentage interest rate per period expressed as a decimal

n = number of periods

Compound interest

$A = P(1 + r)^n$

A = final balance

P = initial quantity

n = number of compounding periods

r = percentage interest rate per compounding period, expressed as a decimal

Future value (A) of an annuity

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

M = contribution per period, paid at the end of the period

Present value (N) of an annuity

$$N = M\left\{\frac{(1 + r)^n - 1}{r(1 + r)^n}\right\}$$

or

$$N = \frac{A}{(1 + r)^n}$$

Straight-line formula for depreciation

$S = V_0 - Dn$

S = salvage value of asset after n periods

V_0 = purchase price of the asset

D = amount of depreciation apportioned per period

n = number of periods

Declining balance formula for depreciation

$S = V_0(1 - r)^n$

S = salvage value of asset after n periods

r = percentage depreciation rate per period, expressed as a decimal

Mean of a Distribution

$$\bar{x} = \frac{\sum x}{n}$$

$$\bar{x} = \frac{\sum fx}{\sum f}$$

$\bar{x}$ = mean

x = individual score

n = number of scores

f = frequency

Formula for a z-score

$$z = \frac{x - \bar{x}}{s}$$

s = standard deviation

Gradient of a straight line

$$m = \frac{vertical\ \ change\ \ in\ \ position}{horizontal\ \ change\ \ in\ \ position}$$

Gradient–intercept form of straight line

$y = mx + b$

m = gradient

b = y-intercept

Probability of an event

The probability of an event where outcomes are equally likely is given by:

$$P(event) = \frac{number\ \ of\ \ favourable\ \ outcomes}{total\ \ number\ \ of\ \ outcomes}$$

1 Rank scores in order:

5, 8, 9, 11, 14, 15, 17, 19, 19

Median = 14 (B)

2 $AB^2 = 19^2 - 9^2 = 280$

$AB = \sqrt{280} = 16.7 \div 17$ (A)

3 110% P = 159.50

1% P = 159.50 ÷ 110

= 1.45

∴ 10% GST = $14.50 (C)

4 $V = \sqrt{6^2 + 2 \times 2.2 \times 10}$

$= 8.3066 \div 8.31$ (C)

5 D

6 Missing angle = 180 − 80 − 35

= 65°

$\therefore \frac{x}{\sin 35^\circ} = \frac{7}{\sin 65^\circ}$

$\therefore x = \frac{7 \sin 35^\circ}{\sin 65^\circ}$ (B)

7 $\frac{Pop}{S_1} = \frac{S_2 \text{ total}}{S_2 \text{ tagged}}$

$\therefore \frac{Pop}{70} = \frac{20}{3}$

$\therefore Pop = \frac{20}{3} \times 70 \div 470$ (C)

8 $V = 4 \times 3 \times 2 = 24$

$24 = \pi r^2 h$

$24 = \pi r^2 \times 2$

$\pi r^2 = 12$

$r^2 = \frac{12}{\pi}$

$r = \sqrt{\frac{12}{\pi}} \div 1.95 \div 2.0$ (B)

9 $16 (C)

10 $\frac{2}{11}$ (B)

11 Amt repaid = 24 × 185

= 4440

∴ Int = 4440 − 3400

= $1040 (D)

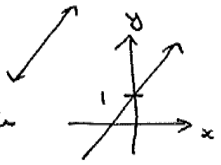
12 $V = \frac{4}{3}\pi \times 1.4^3 \div 11.49 \text{ m}^3$ (B)

13 $y = 3x + 1$

gradient is positive

y-intercept is positive

∴ A



14 Tom is more than $17850 but less than $55850. ∴ Use 2nd last line in table.

23760.90 −

17850

5910.90

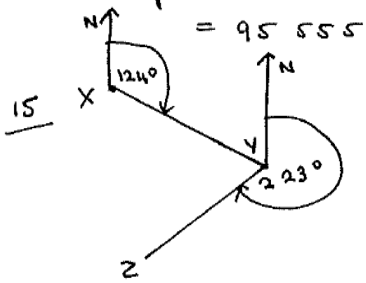
5910.90 ÷ 0.38 = 15555

This is equivalent to his earnings over $80000

∴ Earnings = 80000 + 15555

= 95555 (D)

15



(D)

16 $\frac{p-3}{3} - \frac{p-2}{4} = 1$

$4(p-3) - 3(p-2) = 12$

$4p - 12 - 3p + 6 = 12$

$p - 6 = 12$

$p = 18$ (C)

17 $N = 1200\left\{\frac{(1.05)^{10} - 1}{0.05(1.05)^{10}}\right\} = \$9266$ (C)

Multi Choice cont

18 $A = \frac{1}{2} \times 20 \times 34 \sin 42°$ ✗

(D)

19 D Interest amounts gradually ↑

(D)

20 Prob (not rain) = 0.9

∴ Prob (3 no rain days) $= (0.9)^3$

$= 0.729$

∴ P (at least 1 rainy day)

$= 1 - 0.729 = 0.271$

(B)

21 $A = \frac{80}{360}\left(\pi \times 6\frac{1}{2}^2 - \pi \times 3^2\right)$

$\div 23.2 \text{ cm}^2$ (B)

22 (D)

Team A $Q_1 = 39$ ∴ different

Team B $Q_1 = 35$

Section 2

23a) $Q = 5m(B - A)$

$\therefore Q = 5mB - 5mA$

$\therefore 5mA =$

$A =$

b) $\frac{x+3}{2} - 6 = 5x$

$\therefore x + 3 - 12 = 10x$

$\therefore x - 9 = 10x$

$\therefore -9 = 9x$

$\therefore x = -1$

c) $3x(2x-5) - 6x(x+2)$

$= 6x^2 - 15x - 6x^2 - 12x$

$= -27x$

Section 2 cont

23d) $D = 5\sqrt{\frac{h}{2}}$

$= 5\sqrt{\frac{150}{2}}$

$= 43.30$

$= 43$ km (n. km)

23e)

i) $800 \times 0.67 = 536$ euros

ii) 1 euro $= \frac{1}{0.67}$

$= 1.4925$ dollars

∴ 1000 euros = \$1492.50

23f)

i) 92 rot/min $= \frac{92}{60}$

$= 1.5\dot{3}$ rot/s

ii) 92 rot/min $= 92 \times 3.8$ m/min

$= 349.6$ m/min

$= \frac{349.6 \times 60}{1000}$

$= 20.976$ km/h

24

a) i) $A = \pi \times 80 \times 100$

$= 25\,132.741$

$= 25\,132.7\ m^2$ (1 dp)

ii) No bags $= 25132.7 \div 150$

$= 167.55$

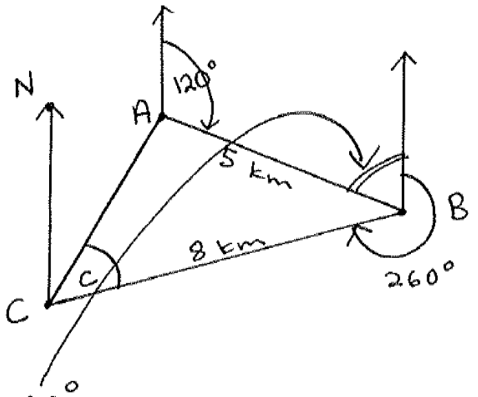
$= 168$ bags

b) $A = \frac{3}{3}[4 + 4\times5 + 5] + \frac{3}{3}[5 + 4\times4 + 0]$

$= 29 + 21$

$= 50\ m^2$

c) i)



ii) $\angle ABC = 360° - 60° - 260°$

$= 40°$

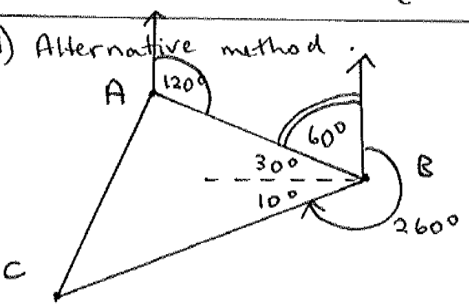
iii) $AC^2 = 5^2 + 8^2 - 2\times5\times8\times\cos 40°$

$= 27.716$

$\therefore AC = 5.2646$

$= 5.26$ km (2 dp)

OR ii) Alternative method:



24

c) iv) $\frac{\sin C}{5} = \frac{\sin 40°}{5.26}$

$\therefore \sin C = \frac{5 \times \sin 40°}{5.26}$

$= 0.610$

$\therefore \angle C = 38°$ $(= \angle BCA)$

Bearing of A from C

$\angle NCB = 180° - (60 + 40)$

$= 80°$

$\angle NCA = 80° - 38°$

Bearing $= 42°$

or 042°

25

a) % discount $= \frac{350}{3450} \times 100\%$

$= 10.144\%$

$= 10.1\%$ (1dp)

b) i) Cost $= 200 + 275 \times 12$

$= \$3500$

ii) SI $= 3500 - 3100 = 400$

$P = \text{amt borrowed} = 3100 - 200 = 2900$

$SI = Prn$

$\therefore 400 = 2900 \times r \times 1$

$\therefore r = \frac{400}{2900}$

$= 0.1379$

$= 13.79\%$

$\doteq 14\%$ p.a.

c) i) $\frac{600}{5} = \$120$ p.a.

ii) $900 - 0.46 \times 250 \times 5$

$= \$325$

d) Amt $= 140\% \times 130\% = 182\%$

$\therefore \uparrow = 82\%$

e) i) $A = \$600$

ii) $B = \$3085.50$

iii) Int $= 2400 \times 0.3\% \times 1$

$= \$7.20$

(Note minimum balance in December is \$2400 on 14 Dec)

26

a) i) Positively skewed

ii) $13 + 7 + 3 + 3 = 26$ y

iii) $\frac{13+7}{103} \times 100\% = 19.4174$

$\doteq 19.4\%$

b) i) East Park, 2 metre

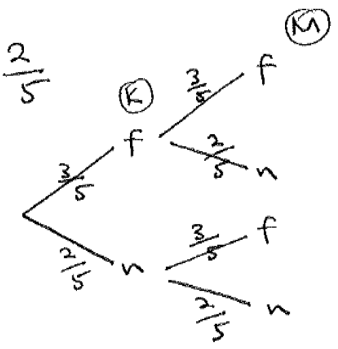
ii)

Central Park	East Park
• Median = 7m,	Med = 4m
∴ Trees in Central Park tend to be taller	
• Spread	
Range = 10 − 4 = 6m,	Range = 18 − 2 = 16m
OR IQR = $9\frac{1}{2} - 4\frac{1}{2}$ = 5m,	IQR = $9\frac{1}{2} - 3$ = $6\frac{1}{2}$ m

∴ Tree heights are more varied in East Park.

c) i) $\frac{2}{5}$

ii)



iii) $\frac{2}{5} \times \frac{3}{5} = \frac{6}{25}$

iv) $1 - P$ (both catch flu)

$= 1 - \frac{3}{5} \times \frac{3}{5}$

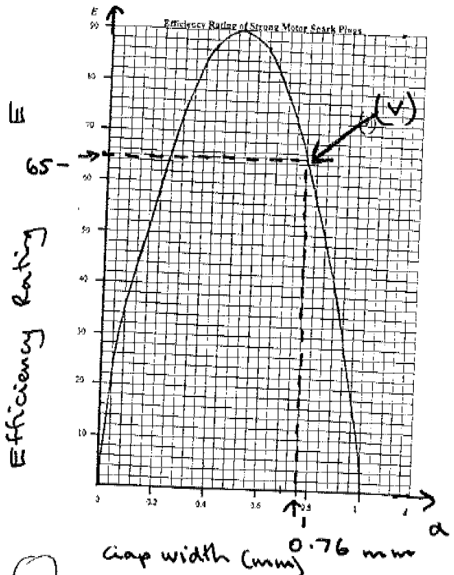
$= \frac{16}{25}$ or 0.64

27

a) i) When $d = 0.5$, $E = 90$

When $d = 0.8$, $E = 57.6$

ii)



iii) (E) is the dependent variable

because: E depends on d in the formula

or: because E is on the vertical axis

iv) $d = 0.5$ mm

v) $d = 0.76$ mm

vi) either: Outside that range E values would be negative

OR: If $d < 0$ there would be a negative gap which is impossible

b) i) 1 000 000

ii) $23 + 73926 = 73949$

iii) $\frac{74\,903}{1\,000\,000} = 7.49\ \%$

iv) $\frac{977}{74\,903}$

28

a) i) $6.240\% \div 12 = 0.0052$

ii) \$ 362.26

iii) \$ 69 366.36

iv)

(α) $680 \times \left\{ \frac{1.0052^{120} - 1}{0.0052 \times (1.0052)^{120}} \right\}$

$= \$60590$

∴ Too small

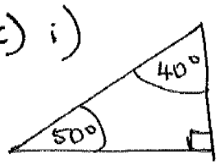
(or smaller than 70 000)

(B) A number between 120 and 200

b) $57\,000 \times (1 - 0.15)^4$

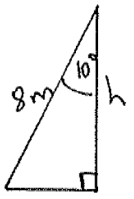
$= \$29754$

c) i)



$40^\circ \div 4 = 10^\circ$

ii)



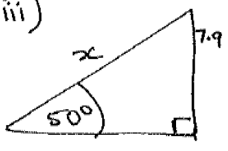
$\cos 10^\circ = \frac{h}{8}$

$\therefore h = 8\cos 10^\circ$

$= 7.878$

$\doteq 7.9$ m

iii)



$\sin 50^\circ = \frac{7.9}{x}$

$\therefore x = \frac{7.9}{\sin 50^\circ}$

$x = 10.312$ m