



**Barker College**

**2005  
TRIAL  
HIGHER SCHOOL  
CERTIFICATE**

# General Mathematics

## ANSWER SHEET

**Staff Involved:**

- LMD      • AES
- TE        • VAB\*
- JWH      • RMH\*
- BJR

**PM FRIDAY 5 AUGUST**

150 copies

**Section I – Multiple Choice**

**Choose the correct response and fill in the response oval completely**

---

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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**General Instructions**

- Reading time – 5 minutes
- Working time – 2.5 hours
- Write using blue or black pen.
- Write your Barker Student Number on the top of every page.
- Approved calculators, graphic calculators and templates may be used.
- Marks may be deducted for careless or poorly arranged work.
- A formula sheet is provided at the back of the paper.

**Total Marks – 100**

<b>Section I</b>	<b>Page s 2– 8</b>
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22 marks

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

<b>Section II</b>	<b>Page 9 – 16</b>
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78 marks

- Attempt Questions 23 – 28
- Show ALL necessary working.
- Allow about two hours for this section.
- Answer on the separate lined paper.
- Write on one side of the page only.

**Section I Total marks (22)**  
**Allow about half an hour for this section.**

**Attempt All Questions**

**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.**

(A)     (B)     (C)     (D)

*correct*  
↙

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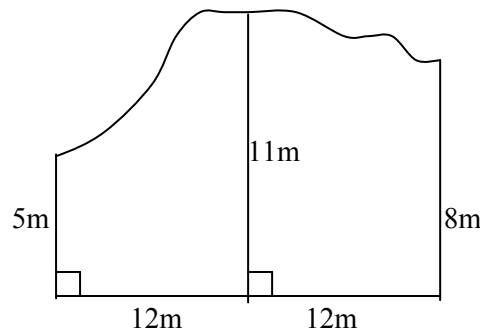
1. Gina has four dogs, five cats and two penguins. If she chooses one of these at random what is the chance she chooses a penguin?

(A)  $\frac{2}{9}$                       (B)  $\frac{2}{11}$                       (C)  $\frac{1}{3}$                       (D) none of these

2. Choose the number which is the biggest.

(A)  $2.8 \times 10^{-3}$                       (B)  $9 \times 10^{-7}$                       (C)  $1.2 \times 10^5$                       (D)  $2.5 \times 10^4$

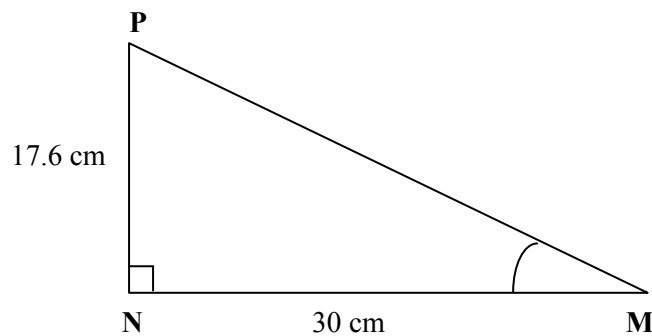
3. Which expression is the best approximation for this area in square metres?



(A)  $\frac{12}{3} \times \{ 5 + 11 + 8 \}$                       (B)  $\frac{12}{3} \times \{ (4 \times 5) + 11 + 8 \}$

(C)  $\frac{12}{3} \times \{ 5 + (4 \times 11) + 8 \}$                        (D)  $\frac{12}{3} \times \{ 5 + 11 + (4 \times 8) \}$

4. Find angle M correct to the nearest degree. (Diagram not to scale)



(A)  $60^\circ$                       (B)  $54^\circ$                       (C)  $36^\circ$                       (D)  $30^\circ$

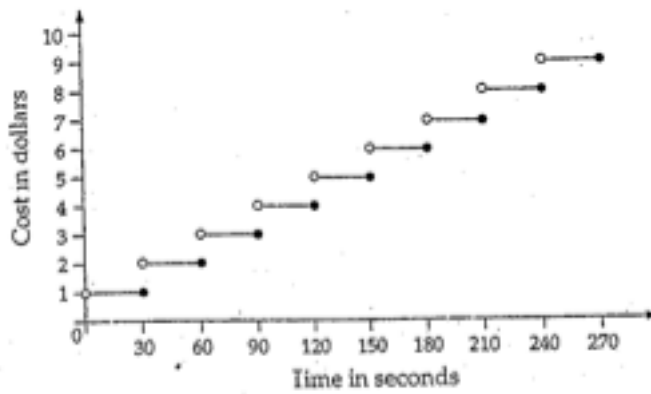
5. The following table shows the monthly repayments for a loan of \$1000. Nic borrowed \$14 000 at 8 % pa reducible interest to be repaid over 20 years. What is the amount of his monthly repayment?

Reducible Interest rate p.a. (%)	Monthly Repayment (\$) for a loan of \$1000		
	10 years	20 years	30 years
5	10.61	6.60	5.37
6	11.10	7.16	6.00
8	12.13	8.36	7.34
10	13.22	9.65	8.78
12	14.35	11.01	10.29

- (A) \$8.36                      (B) \$12.13                      (C) \$117.04                      (D) \$169.82
6. Baby Andrew is 58 cm long correct to the nearest centimetre. What is the absolute error in the measurement?
- (A) 0.05 cm                      (B) 0.5 cm                      (C) 1 cm                      (D) 4 cm
7. Chris's job pays \$12.60 per hour for normal time. His overtime rate is time-and-a-half for any hours he works above 7 hours on one day. Find his pay for a day when he works for ten and a half hours. (Answer to the nearest dollar.)
- (A) \$66                      (B) \$132                      (C) \$154                      (D) \$198
8. P can be found using the formula  $P = 2 \times (1.3)^n$   
Evaluate P given  $n = 5$  (Answer to two significant figures.)
- (A) 7.4                      (B) 13                      (C) 91                      (D) 120
9. Lauren gives birth to triplets. What is the probability they will all be boys? (Assume boys and girls are equally likely.)
- (A)  $\frac{1}{3}$                       (B)  $\frac{1}{6}$                       (C)  $\frac{1}{8}$                       (D)  $\frac{3}{8}$

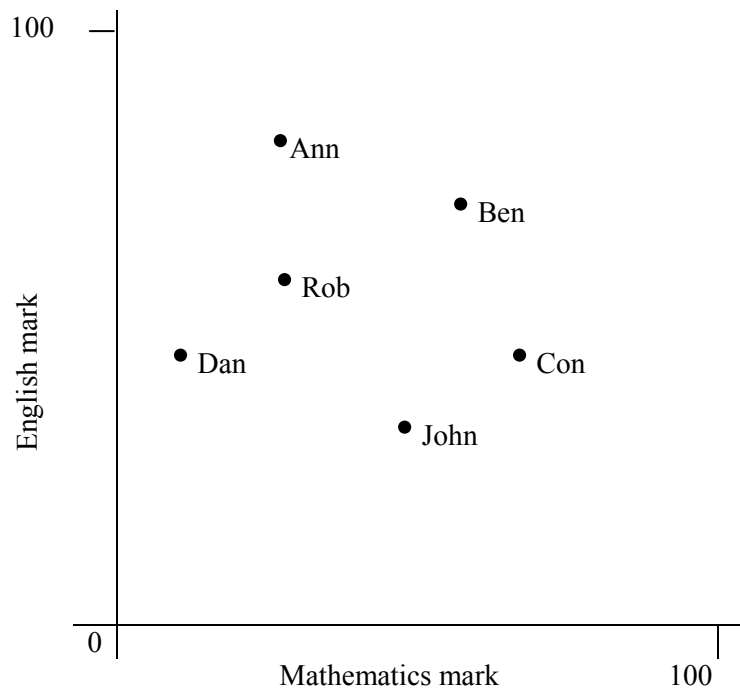
□

10. The step graph shows the cost of telephone calls lasting different lengths of time.



Hilary makes two phone calls, one lasting 1 minute 40 seconds and the other lasting 1 minute 10 seconds. What is the total cost of these two calls?

- (A) \$6                      (B) \$7                      (C) \$8                      (D) \$9
11. The graph below shows the marks scored by students in an English test and a Maths test.

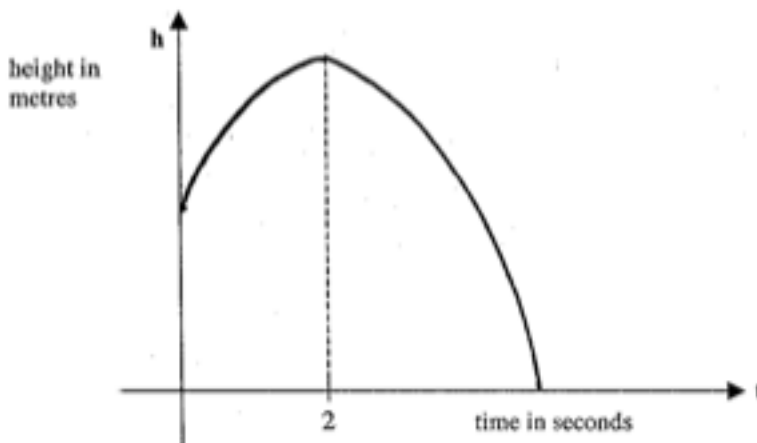


Which student performed better in Maths than John, and better in English than Rob?

- (A) Ann                      (B) Ben                      (C) Con                      (D) Dan

12. A label is to be made to cover just the curved surface of a cylinder (with no overlap). The cylinder has a radius of 6 cm and a height of 9 cm. The area of the label is closest to:
- (A)  $339 \text{ cm}^2$       (B)  $480 \text{ cm}^2$       (C)  $848 \text{ cm}^2$       (D)  $1360 \text{ cm}^2$
13. A journalist's fee is \$340 for 8 hours work. To calculate his fee (F) over a period of time he uses the formula  $F = 42.5 n$   
What does the letter  $n$  represent?
- (A) The earnings per day    (B) The number of days worked  
(C) The number of hours worked                                      (D) The fee charged per hour

14. Patrick throws a ball and its height (h) in metres at any time (t) in seconds is given by the function  $h = -5t^2 + 20t + 60$   
The graph of the function is shown, not to scale.  
What is the maximum height that the ball reaches?



- (A) 2m                      (B) 80 m                      (C) 120 m                      (D) 200 m
15. Sarah earns \$980 for one holiday week, which includes  $17\frac{1}{2}\%$  holiday loading. Which is the correct expression for one week's normal pay?
- (A)  $\$980 - 17.5$     (B)  $\$980 \times 0.825$   
    (D)  $\$980 \div 1.175$
-

16. There are six Christmas lights in a row. Each light changes colour at random, glowing either red, white or green with an equal chance for each colour. Choose the expression which gives the number of possible arrangements of colours.

(A)  $3 \times 3 \times 3 \times 3 \times 3 \times 3$

(B)  $6 \times 6 \times 6$

(C)  $6 \times 5 \times 4 \times 3 \times 2 \times 1$

(D)  $6 \times 3$

17. Which of the following is an example of discrete numerical data?

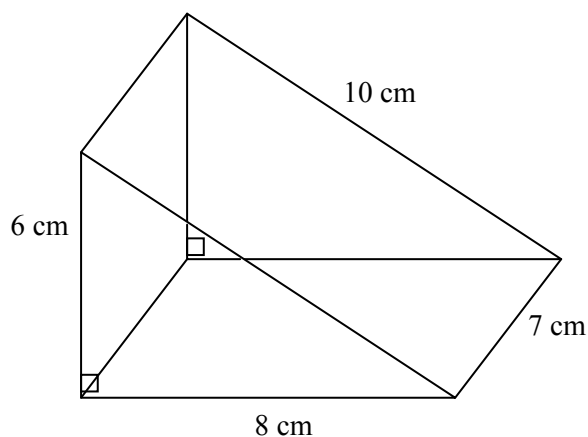
(A) Sam's height

(B) The name of Sam's suburb

(C) Sam's temperature

(D) Sam's house number

18. A triangular prism is shown below. Choose the expression for its volume.



(A)  $\frac{1}{2} \times 7 \times 8 \times 6$

(B)  $\frac{1}{2} \times 6 \times 10 \times 7$

(C)  $\frac{1}{2} \times 6 \times 8 \times 10$

(D)  $\frac{1}{2} \times 6 \times 7 \times 8 \times 10$

19. Melanie needs to select a tennis team of 4 girls from her squad of 7 girls. How many different possible teams can be chosen?

(A) 28

(B) 35

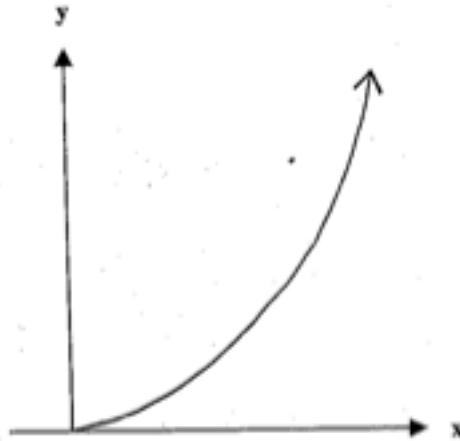
(C) 840

(D) 5040



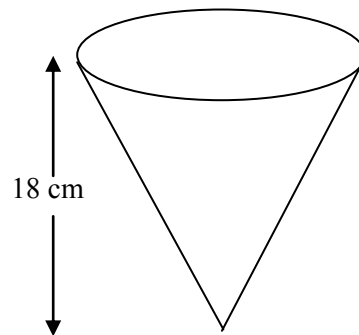
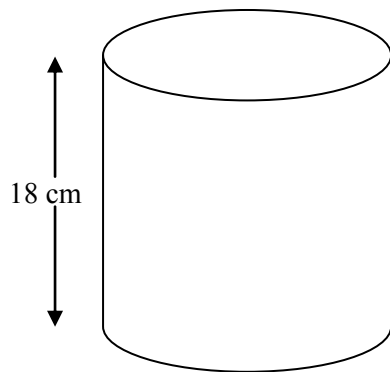
20. The surface area of a sphere is  $2828 \text{ cm}^2$ .  
What is the radius of the sphere to the nearest centimetre?
- (A) 15 cm                      (B) 27 cm                      (C) 47 cm                      (D) 225 cm

21. Which is a possible equation for the function shown?



- (A)  $y = 2x^2$   
 (B)  $y = x^2 + 1$   
 (C)  $y = \frac{1}{x^2}$   
 (D)  $y = 4^x$

22. A plastic cone and cylinder have the same height of 18 cm and the same circular radius. Ricky fills the cone with water and then empties the water from the cone into the cylinder. What level will the water reach in the cylinder?

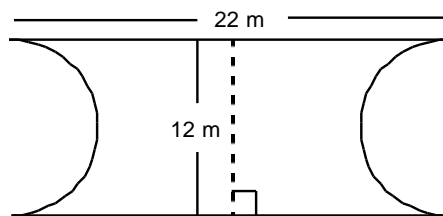


- (A) 6 cm                      (B) 9 cm                      (C) 12 cm                      (D)  $(18 \div \pi)$  cm

**END OF SECTION 1**

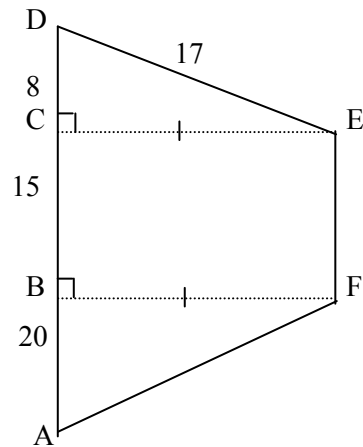
**Section II Total marks (78)****Allow about 2 hours for this section****Show ALL necessary working.****Start each question on a NEW page.****Write on one side of the paper only.****Question 23** (13 marks) Start on a NEW page. **Marks**

- a) Emma earns \$43 000 gross per annum. Each week she has 18% deducted as PAYE tax. A superannuation payment of \$35 is also deducted each week.
- i) Calculate her gross weekly wage (nearest cent). **1**
  - ii) Calculate her weekly wage after deductions (nearest cent). **2**
- b) Tim inherited \$5000 and he invested his money at 9% pa simple interest.
- i) Calculate the total value of his investment after three years. **2**
  - ii) How many years would it take Tim to earn \$2025 simple interest? **2**
- c) Max and Dave each purchased a camera for \$4200. For tax purposes Max calculated his camera's depreciation at 14% pa using **the declining balance method**. (Give answers to the nearest cent.)
- i) How much did Max's camera lose in value in the first year? **1**
  - ii) How much did the camera lose in value during the 4<sup>th</sup> year? **2**
  - iii) Dave used the **straight line method of depreciation** at 10% pa for his camera. Write an equation that gives the value,  $S$ , of Dave's camera after  $n$  years. **1**
  - iv) What was the value of Dave's camera at the end of the 3<sup>rd</sup> year? **1**
  - v) Write a sentence to describe the way an article's value changes as it depreciates according to the straight line method. **1**

**Question 24** (13 marks) Start on a NEW page.

- a) This figure consists of a rectangle with a semicircle cut from each end.
- i) Calculate the area of the figure. (1 dec pl) **3**
  - ii) Calculate the perimeter of the figure. (1 dec pl) **2**

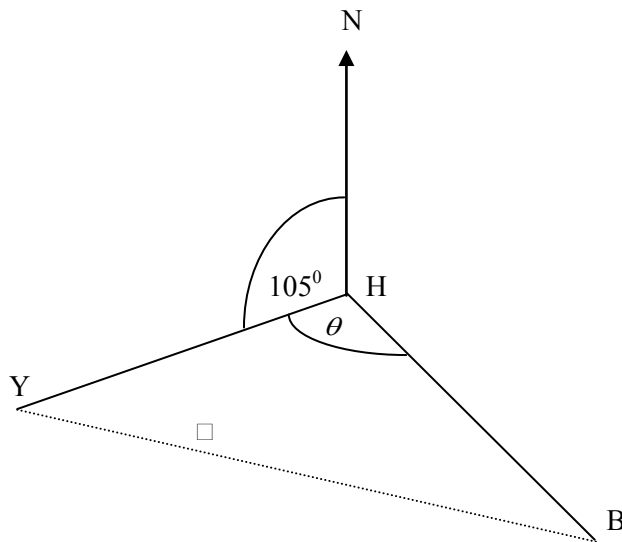
- b) A surveyor measures this field ADEF.  
All measurements are in metres.



**Field notes**

- |      |  |          |
|------|--|----------|
| i)   | Prove that CE equals 15 m                | <b>1</b> |
| ii)  | Copy and complete the field notes above. | <b>1</b> |
| iii) | Find the area of the field ADEF.         | <b>1</b> |

- c) This diagram shows the harbour (H), a yacht (Y) and a boat (B). The boat has a bearing of  $110^\circ$  from the harbour. The yacht is 9 km from the harbour. The boat is 11.5 km from the harbour.



- |      |  |          |
|------|--|----------|
| i)   | Explain why $\theta$ is $145^\circ$                        | <b>1</b> |
| ii)  | Use the cosine rule to find the distance YB (1 dec pl)     | <b>2</b> |
| iii) | Show $\angle HBY$ is $15^\circ$ (to the nearest degree).   | <b>1</b> |
| iv)  | Hence find the bearing of the yacht <b>from the boat</b> . | <b>1</b> |

**Question 25** (13 marks) Start on a NEW page. **Marks**

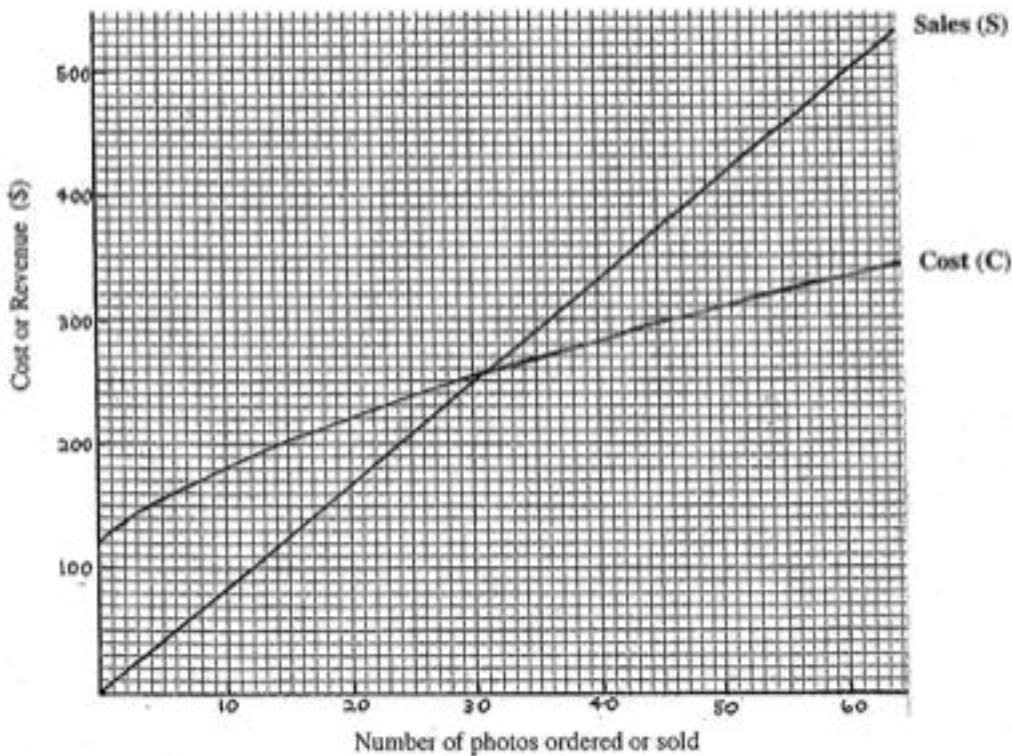
- a) i) Expand and simplify  $4 + 16x - 4(x + 8)$  2
- ii) Solve  $4d + 9 = 24 - 2d$  2
- b) The distance (D) a parachutist falls in metres is given by the formula  $D = 4.9 T^2$  where T is the time in seconds.
- i) How far does the parachutist fall during the first 11 seconds? (1 dec pl) 1
- ii) Find the time taken for the parachutist to fall 800 metres. (1 dec pl) 2

c) A club raises money by selling group photographs.

The cost to the club is given by  $C = 40 \times \sqrt{n+10}$  where n = number of photos the club orders.

The amount from sales is given by  $S = \frac{33n}{4}$  where n = number of photos the club sells.

Profit = Sales minus Cost. C and S are measured in dollars.



Use the graphs for Cost and Sales above to answer parts (i), (ii), and (iii)

- i) Find the **cost** of ordering 26 photos. 1
- ii) Find the **profit** made by ordering and selling 51 photos. 1
- iii) What number of photos must be ordered and sold in order to just cover costs? 1
- iv) Use the **formulas** to find the profit made by ordering and selling 111 photos. 2
- v) The gradient of the graph for sales is  $\frac{33}{4}$ . Explain the meaning of the gradient as it relates to the photos. 1

**Question 26** (13 marks) Start on a NEW page.

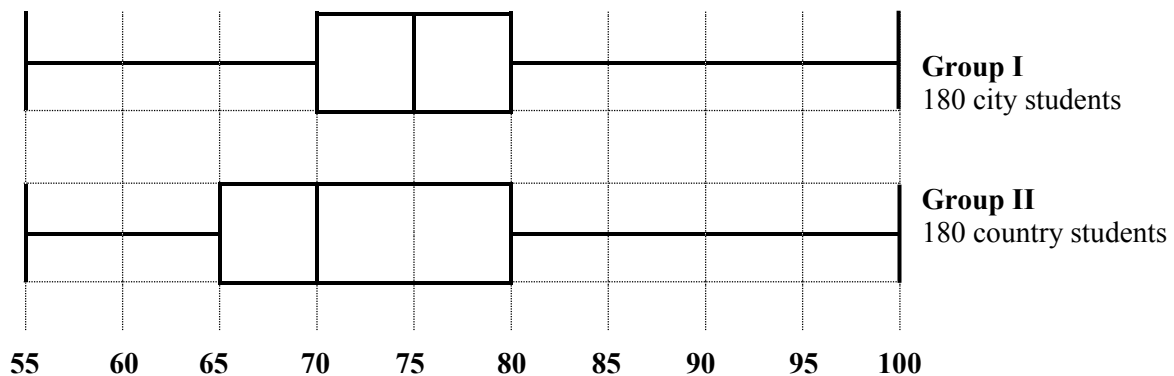
**Marks**

- a) This question is printed on page 17 at the end of this paper. 3  
 Detach page 17 and hand in attached to the rest of your answers to Question 26.

- b) A teacher took a sample of 25 pupils from her primary school and recorded the number of days they had been absent.

Number days away	Number of pupils
0	6
1	9
2	4
3	4
4	2
Total	25

- i) Calculate the mean number of days away. (2 dec pl) 1
- ii) Find the median number of days away. 1
- iii) Explain briefly why, for this particular set of scores, the median is a better measure of centre than the mean. 1
- iv) Calculate the sample standard deviation. (2 dec pl) 1
- v) Estimate how many pupils in the school had no days absent if there were 200 pupils enrolled in the school? 1
- c) Some students from the city and the country took part in a long distance run. The following box and whisker plots record their times in minutes.



**Running Times (minutes)**

- i) Which group was faster overall? Give a reason. 1
- ii) Which group's times were more spread out?  
 Explain why, referring to **two different measures of spread**. 2
- iii) What fraction of the total number of students had times between 70 and 80 minutes? 1
- iv) Briefly describe the shape of the distribution of times for the country group. 1

**Question 27** (13 marks) Start on a NEW page.

- a) Ian throws two dice once. This grid lists some of the possible outcomes.

,1	,2	,3	,4	,5	,6

**It is not essential to complete the grid.**

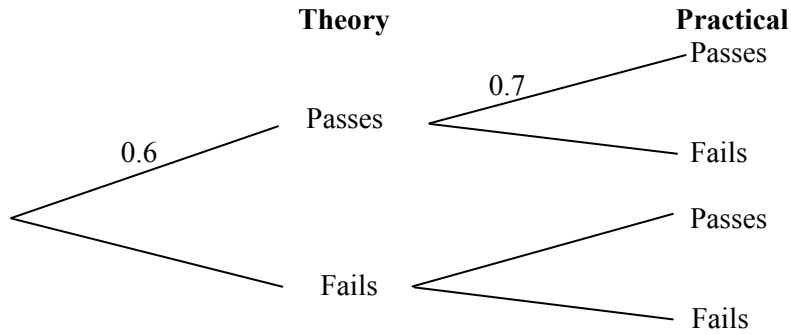
- i) What is the probability Ian will throw a double 6? **1**
- ii) Explain why the probability that Ian will throw any other double is  $\frac{5}{36}$   
**1**
- iii) If Ian throws the dice 252 times how many double sixes can he expect to throw?  
**1**
- iv) Ian plays a game. He pays \$10 to roll the two dice once. If he throws a double six he wins \$200. If he throws any other double he wins \$20. Otherwise he wins nothing. Calculate the financial expectation for playing this game once. **2**

- b) Researchers have developed a new test for the measles virus and have tested it on a group of patients for whom it is already known whether they have the disease or not. The results are shown in the table below.

	Positive Test result	Negative Test result	Totals
Patients with measles	16	4	20
Patients without measles	24	Value A	380
Totals		Value B	400

- i) Write down the missing values A and B on your answer page. **1**
- ii) What percentage of patients had the measles? **1**
- iii) What is the chance that a patient with measles will be correctly identified by this test? **1**
- iv) How many of the tests gave the wrong result? **1**

- c) Becky is applying for Design College. She will be accepted if she passes the theory exam OR the practical exam. She has a 0.6 chance of passing the theory exam and a 0.7 chance of passing the practical exam.



- |      |   |          |
|------|---|----------|
| i)   | Copy and complete the tree diagram.                         | <b>1</b> |
| ii)  | Find the probability that she passes both exams.            | <b>1</b> |
| iii) | Find the probability that she is accepted into the College. | <b>2</b> |

- a) A real estate agent charges the following scale of commission for properties sold:

$2\frac{1}{2}\%$ of the first \$220 000 value 2% of the next \$100 000 value 1% thereafter
--

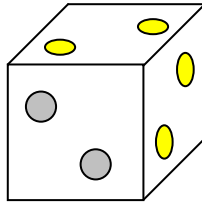
- i) How much commission does an agent earn for selling a house for \$300 000? **1**
- ii) An agent earned \$9900 commission. Find the price of the house he sold. **2**
- b) Nadine was considering investing in an annuity which would be worth \$45 000 after five years, so she could then purchase a hairdressing business. She would have to deposit \$645 at the end of each month. The interest rate is 6% pa compounded monthly. This shows part of her investment schedule.

Month	Balance at beginning of month (\$)	Interest (\$)	Regular Deposit (\$)	Balance at end of month after deposit (\$)
10	5922.46	29.61	645	6597.07
11	6597.07			
12				

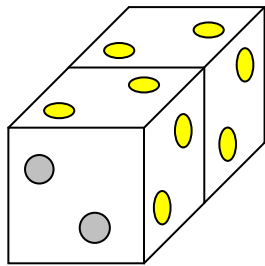
- i) Explain briefly what is meant by an annuity. **1**
- ii) Calculate the interest the bank will pay for the 11<sup>th</sup> month. **1**
- iii) Calculate the balance at the end of the 11<sup>th</sup> month **1**
- iv) Calculate the total interest the bank will pay over the total five year period. **1**
- v) Nadine decided instead to invest in an annuity which would yield the required amount of \$45 000 **after just three years**. The interest rate remained at 6% pa compounded monthly. Use the future value annuity formula to calculate the amount she must deposit each month in this case. **2**



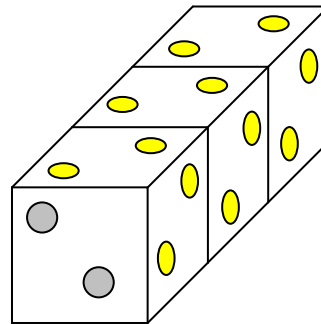
- c) If we place two dots on each face of a cube there will be 12 dots on the outer surface.



If two cubes are joined as shown, the number of dots on the outer surface will be 20.



Three cubes joined in the same way will give 28 dots.



- i) Copy and complete this table.  
**C** stands for the number of cubes and **D** for the number of dots.

1

C	1	2	3
D			

- ii) Four cubes are joined in the same way.  
 How many dots will there be on the outer surface?
- iii) Write down the equation that gives the number of dots (**D**)  
 for any number of cubes (**C**).
- iv) How many cubes, joined in the same way, are needed if there are to be  
 236 dots on the outer surface?

1

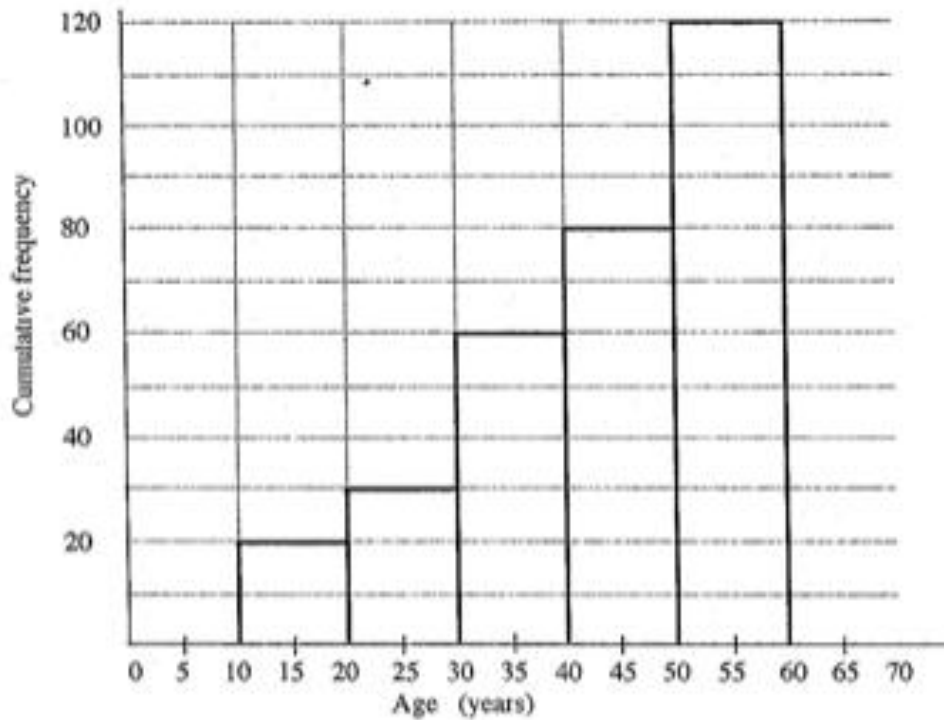
1

1

**END OF PAPER**

**Question 26**

- a) This cumulative frequency histogram shows the number of people attending a cinema, grouped in ten year age brackets.



- i) How many people were aged over thirty?

\_\_\_\_\_

**1**

- ii) Use the graph to determine the upper quartile value for age, clearly showing your working.

**2**