BOARD OF STUDIES
NEW SOUTH WALES

HIGHER SCHOOL CERTIFICATE EXAMINATION

1996

MATHEMATICS IN PRACTICE

2 UNIT

Time allowed—Two hours and a half
(Plus 5 minutes' reading time)

DIRECTIONS TO CANDIDATES

- Board-approved calculators may be used.
- The mark out of 80 will be converted to a mark out of 100.

Section I (30 marks)

- This Section contains 30 multiple-choice questions.
- Attempt ALL questions.
- All questions are of equal value.
- Mark your answers in pencil on the Answer Sheet provided.
- Allow about one hour for Section I.

Section II (50 marks)

- Attempt ALL questions.
- All questions are of equal value.
- Answer the questions in the spaces provided in this paper.
- Write your Student Number and Centre Number in the spaces provided on the first page of each question.
- Show all necessary working.
- Marks may be deducted for careless or badly arranged work.
- Allow about one hour and a half for Section II.

SECTION I

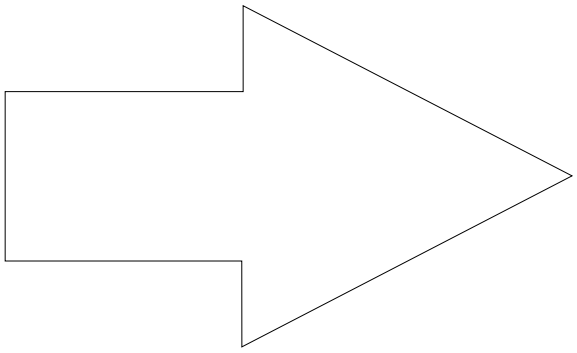
Attempt ALL questions.

All questions are of equal value.

Select the alternative A, B, C, or D that best answers the question.

Mark your answers in pencil on the *separate* Answer Sheet provided.

1 .



The arrow shown is made up of the following two shapes.

(A) A rectangle and an isosceles triangle.

(B) A rectangle and an equilateral triangle.

(C) A square and an isosceles triangle.

(D) A square and an equilateral triangle.

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2 . The table shows train fares for travel from Sydney to Adelaide.

TRAIN FARES: SYDNEY TO ADELAIDE		
	First class $	*Holiday class* $
	One-way	One-way
Normal Low	188 170	79 72
	Return	Return
Normal Low	366 330	148 134
Normal Season: 1 July 1996 – 31 January 1997 Low Season: 1 February 1997 – 31 March 1997		

Carl will make a one-way trip from Sydney to Adelaide during March 1997. He will travel first class.

Find the cost of his trip.

(A) $170 (B) $183 (C) $188 (D) $330

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3 . Kramer is repainting his apartment. The total wall area to be repainted is 182 square metres. One litre of paint will cover 8 square metres.

How many four-litre cans of paint will Kramer need?

(A) 2 (B) 5 (C) 6 (D) 23

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4 . The following table lists the number of rainy days in each month for the capital cities in Australia.

	MONTH											
	J	*F*	*M*	*A*	*M*	*J*	*J*	*A*	*S*	*O*	*N*	*D*
Melbourne	8	7	9	12	14	14	15	16	15	14	12	11
Sydney	11	11	12	11	11	9	10	10	11	11	11	11
Brisbane	14	14	15	11	10	8	7	7	7	10	10	11
Adelaide	5	4	6	9	14	13	16	16	13	11	8	7
Perth	3	3	4	8	13	18	18	16	13	10	7	4
Canberra	8	7	7	8	9	9	10	11	10	11	10	8
Darwin	21	20	19	9	2	0	1	1	2	7	12	16
Hobart	9	8	10	11	13	11	13	15	14	13	14	13

'Mathematics at work - modelling your world' vol2, I lowe, Australian Academy of Science, p138.

Which city has the greatest number of rainy days in December, January, and February?

(A) Adelaide (B) Brisbane (C) Canberra (D) Darwin

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5 . Candice borrowed $70 000 from the bank to purchase a home unit. Her repayments were $680 per month for 25 years.

How much interest did she pay?

(A) $87 000 (B) $134 000 (C) $204 000 (D) $274 000

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6 . The exchange rate between Malaysian Ringgit and Australian dollars is shown below.

$$\$A1 = 1{\cdot}9 \text{ Ringgit}$$

Soraya changed one $A100 note and three $A50 notes using this exchange rate.

What is the best approximation for the amount she received?

(A) 132 Ringgit (B) 285 Ringgit (C) 380 Ringgit (D) 475 Ringgit

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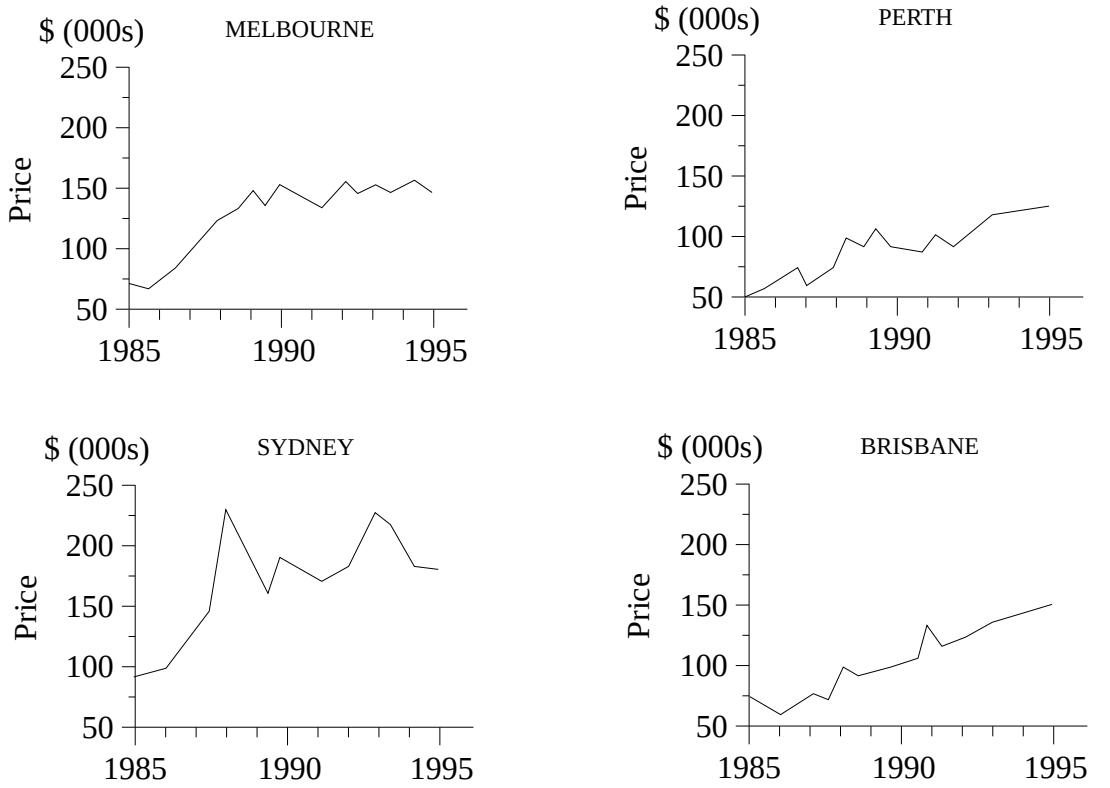
USE THE FOLLOWING GRAPHS TO ANSWER QUESTIONS 7 AND 8.

The graphs show median house prices in thousands of dollars, in four capital cities from 1985 to 1995.



7 . The percentage increase in the median house price in Perth from 1985 to 1995 was approximately

(A) 75% (B) 125% (C) 150% (D) 250%

8 . Which of the following statements is true?

(A) Median house prices in all cities increased continuously from 1985 to 1995.

(B) The median house price in Melbourne increased by a large amount between 1992 and 1995.

(C) The median house price in Brisbane in 1995 was approximately double that in 1985.

(D) The median house price in Sydney was greater in 1995 than it was in 1988.

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9 . Fluffy Shampoo costs \$3·50 per 500 mL bottle and Blast Shampoo costs \$2·85 per 400 mL bottle. Timothy buys 2 litres of shampoo.

How much does he save by choosing Fluffy Shampoo rather than Blast Shampoo?

(A) \$0·25 (B) \$0·65 (C) \$2·60 (D) \$6·10

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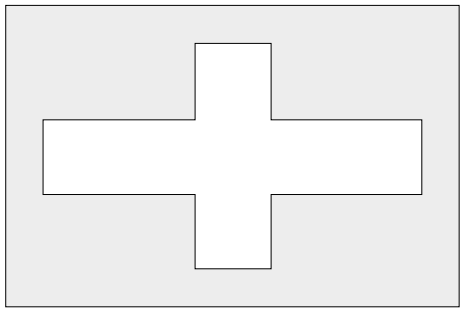
10. 

The area of the white cross is closest to

(A) 6 cm^2

(B) 7 cm^2

(C) 8 cm^2

(D) 15 cm^2

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11. TV advertisements run for 15 seconds, 30 seconds, or 45 seconds. A set of advertisements is to run for $1\frac{1}{2}$ minutes.

Which of the following combinations of advertisements could be used for this set?

(A) Two 15 second advertisements, one 30 second advertisement, and one 45 second advertisement.

(B) Three 15 second advertisements and three 30 second advertisements.

(C) One 15 second advertisement, two 30 second advertisements, and one 45 second advertisement.

(D) Two 15 second advertisements and two 30 second advertisements.

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12. The following table gives the average amount of water used in a shower.

Average water used per shower per person	
Shower (8 minutes) (ordinary rose)	125 L
Shower (4 minutes) (ordinary rose)	70 L
Shower (8 minutes) (water-efficient rose)	80 L
Shower (4 minutes) (water-efficient rose)	45 L

Mr and Mrs Katrib and their two children have decided to use less water in the shower to help reduce their water bill. They have changed the ordinary shower rose to a water-efficient rose. They have all agreed to reduce their showers from 8 minutes to 4 minutes. Each member of the family showers once every day.

Use the table to estimate how much water the family will save in a week.

(A) 1260 L (B) 1540 L (C) 1960 L (D) 2240 L

13.

Train timetable—Tarcoola/Adelaide		
Tarcoola	Arr. Dep.	11:25 p.m. 11:55
Port Augusta	Arr. Dep.	6:15 a.m. 6:50
Coonamia	Arr. Dept.	8:01 a.m. 8:06
Adelaide	Arr.	11:30 a.m.

Use this timetable to find the travelling time, by train, from Tarcoola to Port Augusta.

(A) 5 hours 40 minutes (B) 6 hours 20 minutes

(C) 6 hours 50 minutes (D) 6 hours 55 minutes

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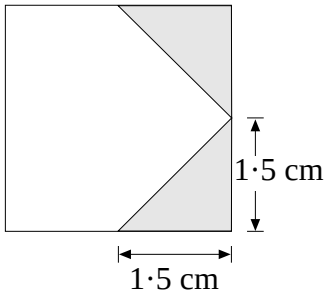
14. What fraction of the square is shaded?



(A) $\frac{1}{8}$ (B) $\frac{1}{4}$ (C) $\frac{1}{3}$ (D) $\frac{3}{8}$

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15. Judy-Ann drove 200 km from Hobart to Launceston. The drive took her 2 hours 10 minutes.

Find her average speed.

(A) 65 km/h (B) 92 km/h (C) 95 km/h (D) 100 km/h

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16. The table below shows the number of sales of some leading magazines in Australia in 1994 and in 1995.

MAGAZINE SALES		
Publication	*1995*	*1994*
Cosmopolitan	502 338	558 230
Girlfriend	242 296	217 244
Woman's Day	1 976 586	2 052 714
Better Homes and Gardens	638 382	469 854

Which magazine has shown the greatest increase in sales between 1994 and 1995?

(A) Cosmopolitan (B) Girlfriend

(C) Woman's Day (D) Better Homes and Gardens

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17. Dana owns a property with a ratable value of $290 000. Her local council calculates annual rates at 0·3739 cents per dollar of ratable value. In addition, there is an annual waste management fee of $145·60.

What is the annual amount Dana will have to pay the local council?

(A) $1084·31 (B) $1085·77 (C) $1229·91 (D) 7901.68

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18. Moranbah has latitude 22°S and longitude 148°E. Mitchell is due south of Moranbah.

Which of these could be the latitude and longitude of Mitchell?

(A) 26°S, 148°E (B) 18°S, 148°E (C) 22°S, 152°E (D) 22°S, 144°E

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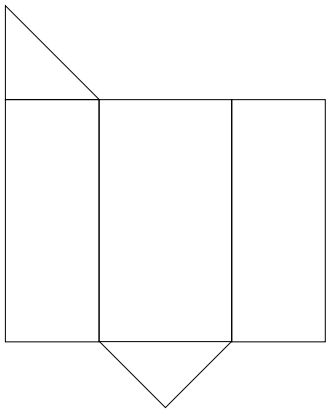
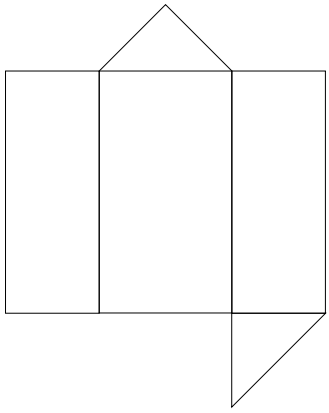
19. Which of the following nets could be folded to form a triangular prism?

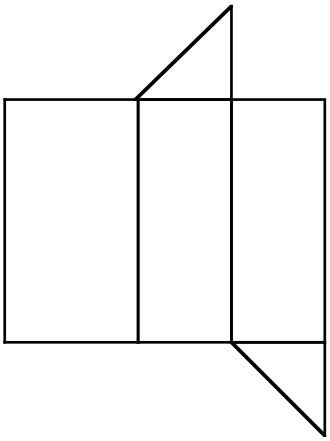
(A)



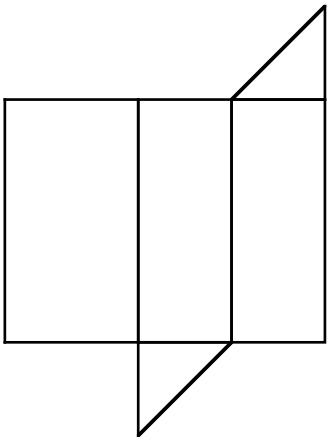
(B)



(C)



(D)



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20. The table below shows car insurance premiums.

	PREMIUMS ($)			
	Under 25 years old		*Over 25 years old*	
Type of car	*6 mths*	*12 mths*	*6 mths*	*12 mths*
1990 Commodore	1316	2106	766	1225
1990 Toyota Corolla	1368	2189	796	1273

Vanaja is 24 years old. She insures a 1990 Commodore for 6 months. Nadia is 28 years old. She insures a 1990 Toyota Corolla for 12 months.

Calculate the difference in the cost per month of the premiums for Vanaja and Nadia.

(A) $43·00 (B) $102·50 (C) $113·25 (D) $125·92

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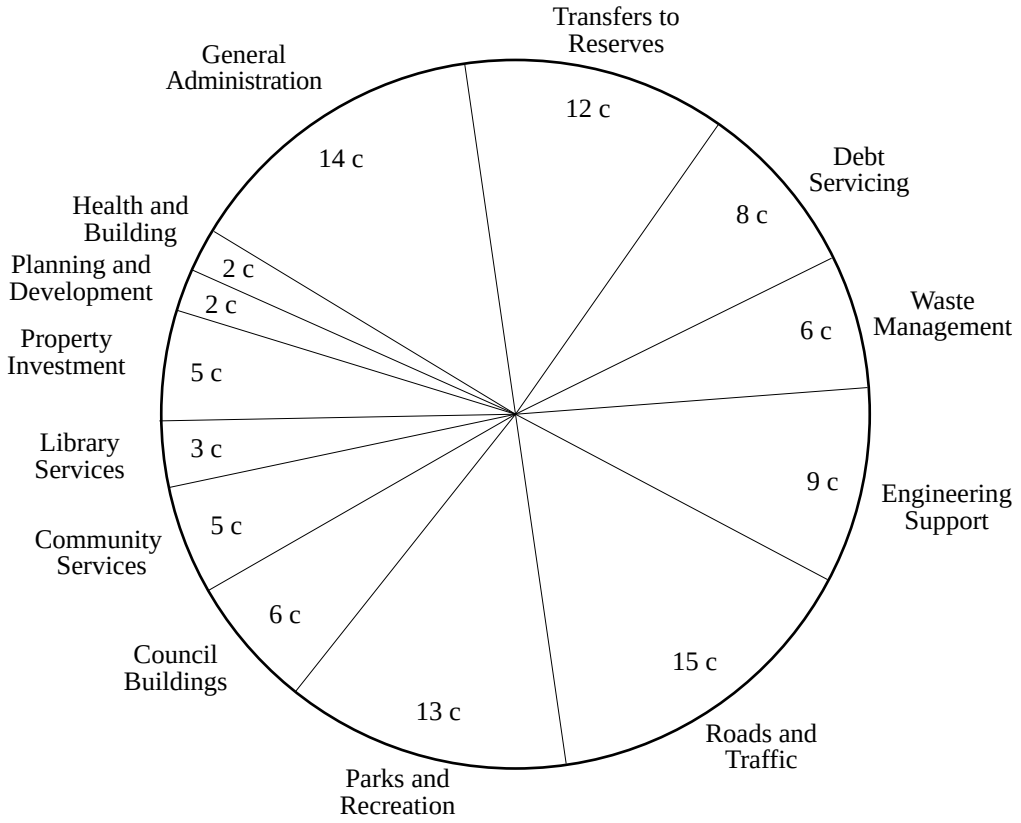
21. A city council spent $140 million in the 1995–96 financial year. The graph shows how each dollar was spent.

HOW THE DOLLAR WAS SPENT IN THE 1995–96 FINANCIAL YEAR

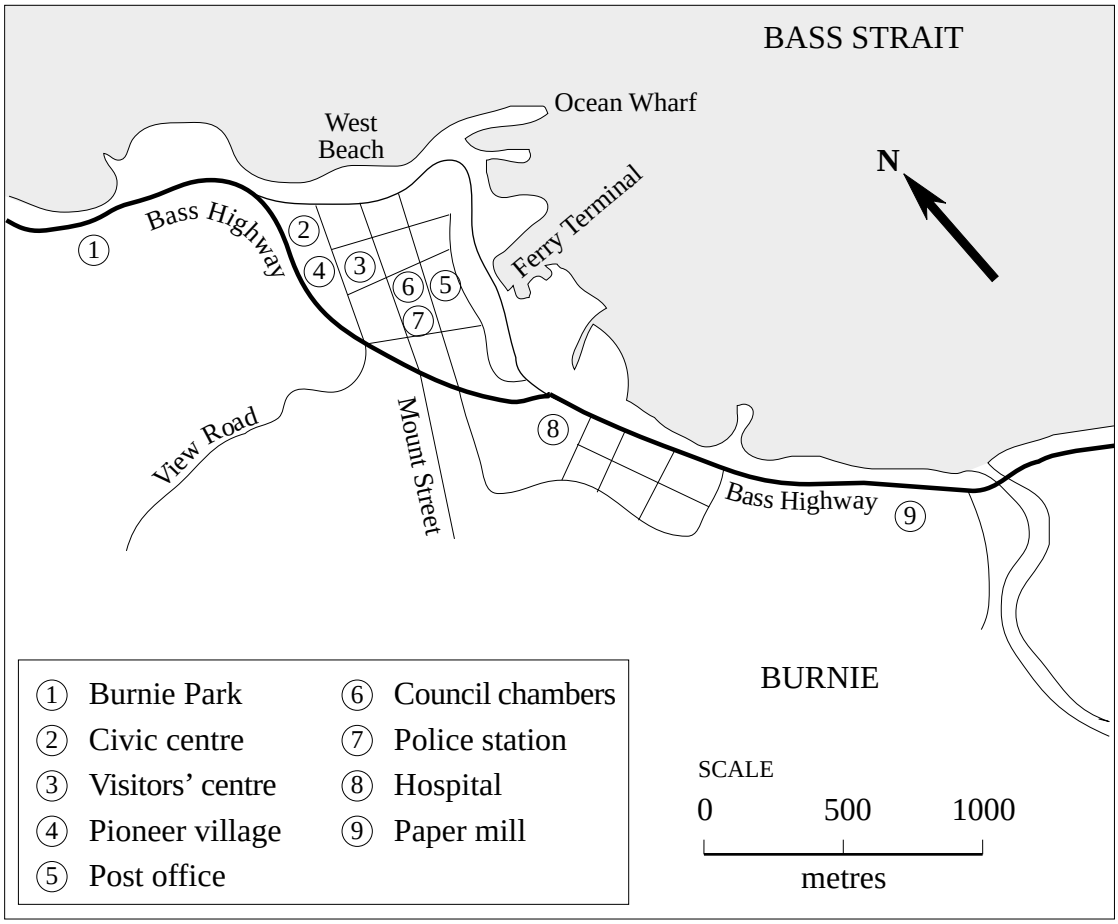


Sutherland Shire Council 95-96 Report to rate Payers. Reproduced with permission.

How much more was spent during the year on Roads and Traffic than on Waste Management?

(A) $8 400 000 (B) $9 000 000 (C) $12 600 000 (D) $21 000 000

USE THIS MAP TO ANSWER QUESTIONS 22 AND 23.



22. In which direction is the hospital from the post office?

(A) south (B) north (C) south-east (D) north-west

23. Brett and Peter cycle from Burnie Park along the Bass Highway to the paper mill.

Approximately how far do Brett and Peter cycle?

(A) 1·2 km (B) 3·3 km (C) 12 km (D) 33 km

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24. When it is noon on Friday in Atlanta, it is 5:00 a.m. on Saturday in Sydney. The 200 m women's free-style final at the Olympic Games in Atlanta was scheduled for 11:00 a.m. on Wednesday.

What time was this in Sydney?

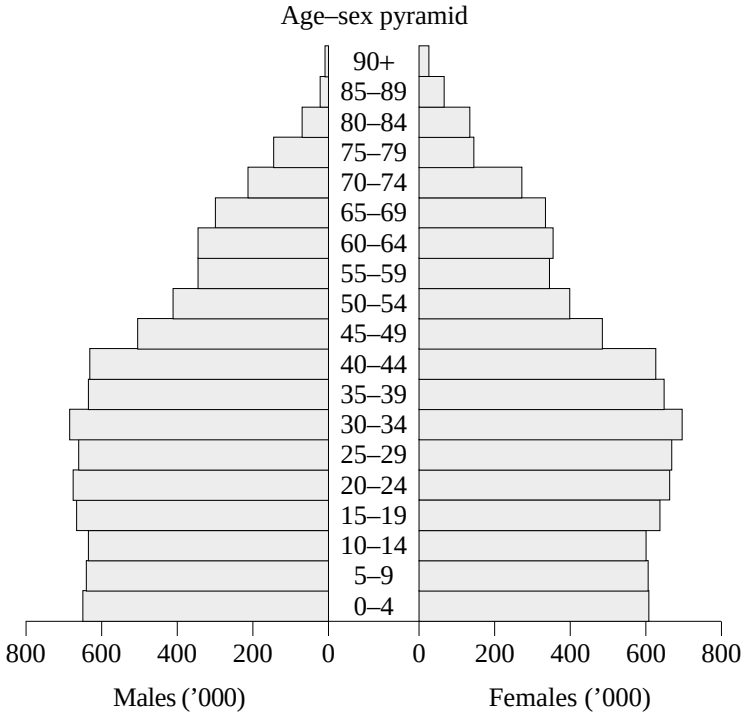
(A) 4:00 a.m. Tuesday (B) 6:00 p.m. Tuesday

(C) 6:00 p.m. Thursday (D) 4:00 a.m. Thursday

USE THE GRAPH BELOW TO ANSWER QUESTIONS 25, 26, AND 27.

The age–sex pyramid below shows Australia's population by both age-group and sex, based on the 1991 Census.

POPULATION, AUSTRALIA, 1991 CENSUS



Source: Australian Bureau of Statistics. Cat no 1331.0, 1994.

25. How many females were under 10 years of age in Australia in 1991?

(A) 610 000 (B) 1 220 000 (C) 1 290 000 (D) 1 820 000

26. Use the graph to determine which of the following groups had the largest population in 1991.

(A) 30 to 34 year old females (B) 25 to 29 year old males

(C) 70 years and over males (D) 70 years and over females

27. The total population in Australia at the 1991 Census was close to 17 000 000.

What percentage of the total population was 30–34 years old?

(A) less than 1% (B) 4% (C) 5% (D) 8%

28. A bank charges interest at 16·75% per annum for credit cards. Tanya owes $400 on her credit card.

How much interest is Tanya charged on this amount for a thirty-day period?

(A) $2·01 (B) $2·23 (C) $5·51 (D) $5·58

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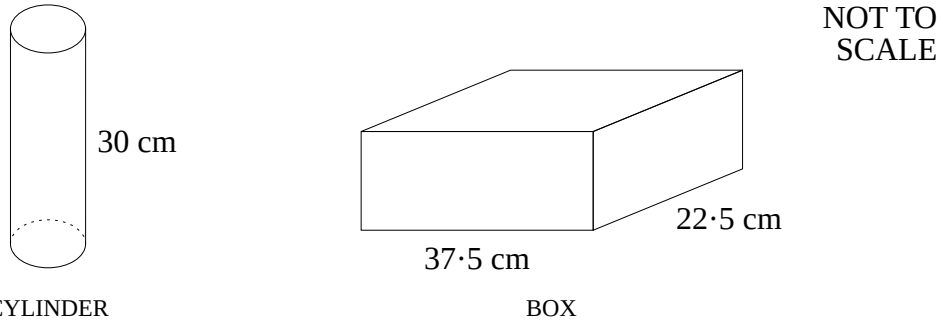
29. Four tennis balls just fit into the cylinder shown.



How many tennis balls will fit in the first layer of a box with the dimensions shown above?

(A) 9 (B) 15 (C) 25 (D) 30

---

30. The Simpsons' house increased in value by 6% during 1995. At the end of 1995, the house was worth $410 000.

What was it worth at the beginning of 1995, correct to the nearest $100?

(A) $385 400 (B) $386 700 (C) $386 800 (D) $434 600

EXAMINER'S USE ONLY

Q. 31

STUDENT NUMBER

CENTRE NUMBER

1996
HIGHER SCHOOL CERTIFICATE EXAMINATION
MATHEMATICS IN PRACTICE
2 UNIT

SECTION II

Attempt ALL questions.

All questions are of equal value.

Answer the questions in the spaces provided.

Write your Student Number and Centre Number in the spaces provided on the first page of each question.

QUESTION 31. The Consumer

(a) Zac borrows $6000 from a finance company for eighteen months. The flat rate of interest on this loan is 13·75% per annum.

How much interest does Zac pay on this loan?

……

……

……

Question 31 continues on page 14

QUESTION 31. (Continued)

(b) The tables below show costs for pay TV.

Dingo Vision	
Installation Fee	\$19·95
Monthly fee—25 channels	\$39·95
Monthly fee—50 channels	\$45·95
For a yearly subscription, the monthly fee is reduced by 10%.	

Goanna Tel	
Installation Fee	\$45·00
Monthly fee—25 channels	\$33·95
Monthly fee—50 channels	\$40·95
For a yearly subscription, the monthly fee is reduced by 10%.	

(i) Udo subscribes to 25 channels from Dingo Vision for six months.

Calculate the total amount spent by Udo, including any initial cost.

……

……

……

……

(ii) Margaret subscribes to 50 channels from Goanna Tel and pays a yearly subscription.

Calculate the total amount spent by Margaret in the first year, including any initial cost.

……

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……

……

QUESTION 31. (Continued)

(c)

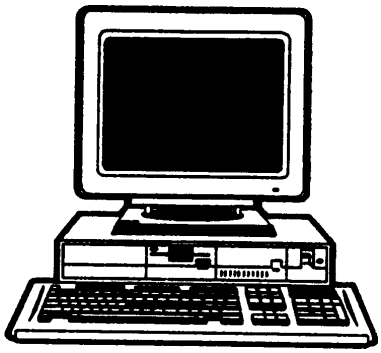
TRANG'S COMPUTER PARADISE

Super Action 5200 computer with internal fax/modem and CD-ROM

Full price: $3995 with 10% discount for cash sales

OR

36 monthly payments of $135.



(i) Sue decides to pay cash for this computer.

How much will she pay?

……

……

(ii) Jim decides to buy this computer on the terms available. He will pay thirty-six monthly payments of $135·00.

How much will Jim pay for the computer?

……

……

(iii) How much interest will Jim pay?

……

……

(iv) Calculate the yearly interest rate that Jim is charged.

……

……

Question 31 continues on page 16

QUESTION 31. (Continued)

(d) The tables below show amounts of life insurance cover that can be purchased using different monthly plans.

FEMALE—NON-SMOKER			
Age	*$10 per month plan* ($)	*$15 per month plan* ($)	*$20 per month plan* ($)
20–28	87 719	131 579	175 439
29	88 496	132 743	176 991
30	88 496	132 743	176 991
31	88 496	132 743	176 991
32	87 719	131 579	175 439
33	86 207	129 310	172 414

FEMALE—SMOKER			
Age	*$10 per month plan* ($)	*$15 per month plan* ($)	*$20 per month plan* ($)
20–28	48 780	73 171	97 561
29	49 020	73 529	98 039
30	49 261	73 892	98 522
31	49 020	73 529	98 039
32	48 544	72 816	97 087
33	48 077	72 115	96 154

Premium tables supplied by NRMA life limited.

(i) Sandy, aged 32, is a non-smoker.

How much life insurance cover can she purchase for $15 per month?

……

……

(ii) Grace, aged 32, is a smoker.

How much *less* life insurance cover than Sandy can she purchase for $15 per month?

……

……

EXAMINER'S USE ONLY

Q. 32

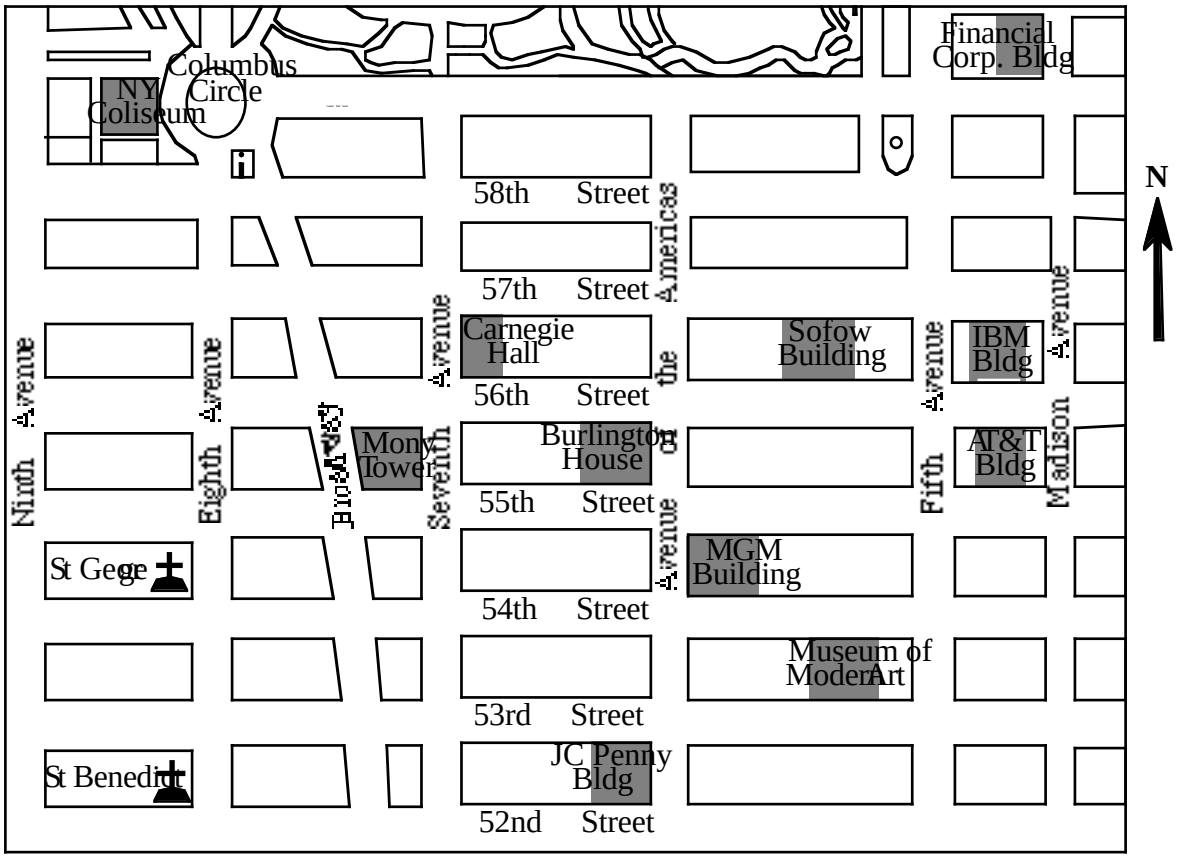
STUDENT NUMBER

CENTRE NUMBER

1996
HIGHER SCHOOL CERTIFICATE EXAMINATION
MATHEMATICS IN PRACTICE
2 UNIT—SECTION II

QUESTION 32. Travel

(a) The map below is a part of a street map of New York.



(i) What building lies on Seventh Avenue, between 56th Street and 57th Street?

……

(ii) From the corner of 8th Avenue and 55th Street, Mia and Anil walk east to Fifth Avenue. Then they walk north for three blocks, turn right, and walk for one block.

Mark this route clearly on the street map above.

Question 32 continues on page 18

QUESTION 32. (Continued)

(b) The table below shows how frequent-flyer points are earned on Eagle Airways.

NUMBER OF POINTS PER KILOMETRE			
First class	Business class	Full-fare economy	Discount economy
1·50	1·25	1·00	0·70

(i) The distance from Cairns to Perth is 5568 km.

How many frequent-flyer points would you earn for a return trip from Cairns to Perth, flying Business class?

……

……

(ii) 15 000 frequent-flyer points are needed for a free flight from Sydney to San Francisco.

How far would you need to fly in Discount economy to earn 15 000 points?

……

……

(c) A flight schedule for flight number EM459 from Sydney to San Francisco is shown below. Times shown are in 24 hour time.

Monday	2 Oct.	Departs	Sydney	10:30 local time
Monday	2 Oct.	Arrives	San Francisco	06:05 local time

San Francisco is 18 hours behind Sydney.

How long does this flight take?

……

……

QUESTION 32. (Continued)

(d) Gus plans a holiday in Germany. He will hire a car for 23 days. There are two options.

Option A	*Option B*
Return airfare plus car hire : $2899 (Airfare only : $2010)	Return airfare : $1570 Car hire : $315 for each whole week + $54 for each additional day

(i) Find the daily cost of hiring a car using Option *A*.

……

……

(ii) Using Option *B*, find the total cost of airfare and car hire.

……

……

(e) The following table shows an advertisement for hotel rates over the Easter period.

EASTER RATES			
Hotel	*Room rate* ($)	*Room + breakfast for 2* ($)	*Breakfast per person* ($)
Adelaide	120	145	15
Brisbane	160	195	20
Cairns	185	235	30
Melbourne	155	190	20
Perth	160	190	20
Sydney	175	215	25
Easter Bonus If you stay 4 consecutive nights, your 5th night is free (accommodation only). Rates are valid for the Easter period.			

Jay and Tara book a room at the Cairns Hotel for 5 nights over the Easter period. They choose the 'Room + breakfast for 2' option.

Use the information in the table to calculate their account for room plus breakfast for the 5 nights.

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EXAMINER'S USE ONLY

Q. 33

STUDENT NUMBER

CENTRE NUMBER

1996
HIGHER SCHOOL CERTIFICATE EXAMINATION
MATHEMATICS IN PRACTICE
2 UNIT—SECTION II

QUESTION 33. Accommodation

(a) A real-estate agent charges the following fees for selling property:

- 3% of the first $100 000 of the sale price;
- 1·5% of the remainder of the sale price.

In addition, there is a flat fee of $750 if the property is auctioned.

Janet sells her house at auction for $360 000.

What is the agent's fee?

……

……

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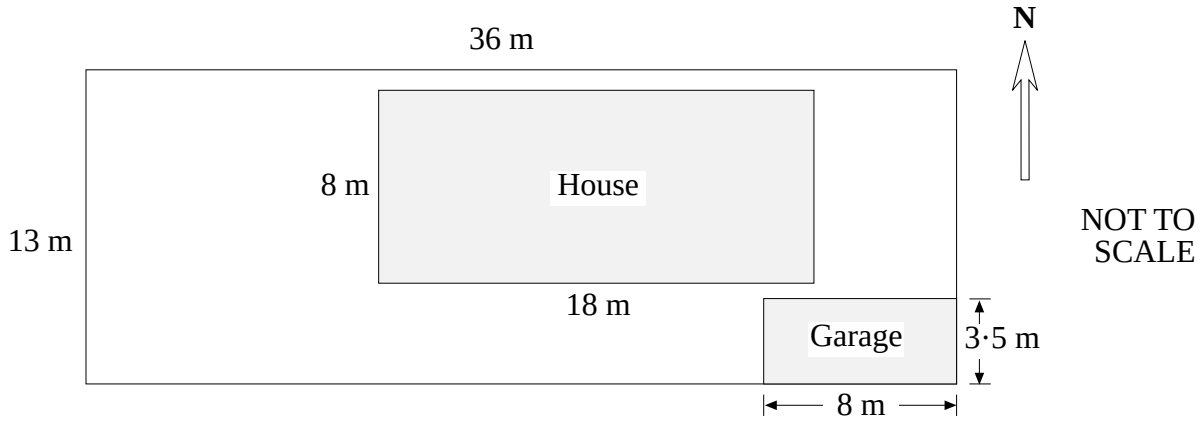
Question 33 continues on page 22

QUESTION 33. (Continued)

(b) The diagram shows the plan of a building site.



(i) What total area of land do the house and garage cover?

……

……

(ii) What percentage of the building site is taken up by the house and garage?

……

……

(iii) There is a brick wall, 900 mm high, along the northern boundary of the building site.

What is the area of the brick wall in square metres?

……

……

(iv) 500 bricks are needed to build 10 square metres of wall.

How many bricks were used to build the wall in part (iii)?

……

……

(v) The guttering around the perimeter of the house is to be replaced. Guttering costs $30 per metre.

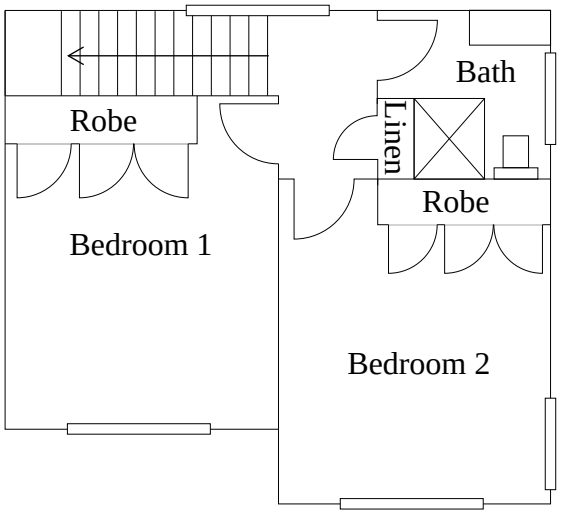
How much will the new guttering cost?

……

……

QUESTION 33. (Continued)

(c) This is the floor plan of a first-floor addition to Lois and Clark's house.



(i) How many doors are shown on this plan?

……

(ii) A bed 1·8 m long and 1·8 m wide is to be placed in Bedroom 1 under the window.

Draw the bed to scale on the plan.

(iii) The cost of building this addition is $36 540. Its floor area is 42 square metres.

What is the cost of the addition per square metre of floor area?

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EXAMINER'S USE ONLY

Q. 34

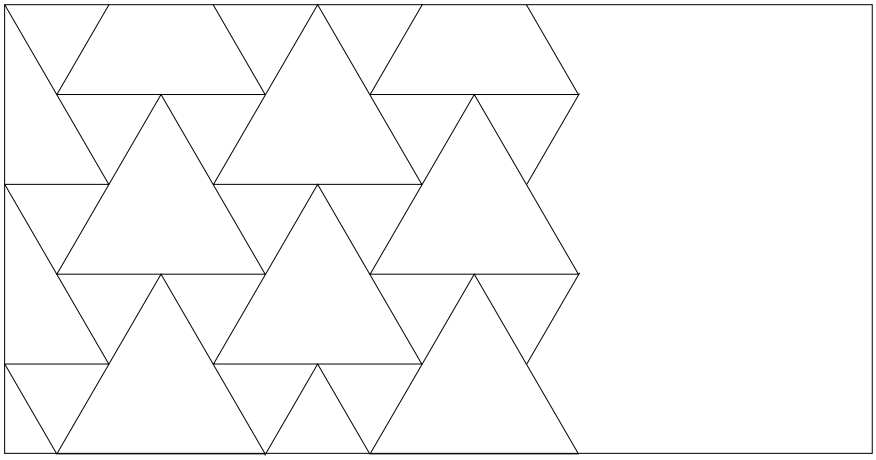
STUDENT NUMBER

CENTRE NUMBER

1996
HIGHER SCHOOL CERTIFICATE EXAMINATION
MATHEMATICS IN PRACTICE
2 UNIT—SECTION II

QUESTION 34. Design

(a) The diagram below shows a section of a tessellation.



(i) Describe the geometric shapes that make up the above tessellation.

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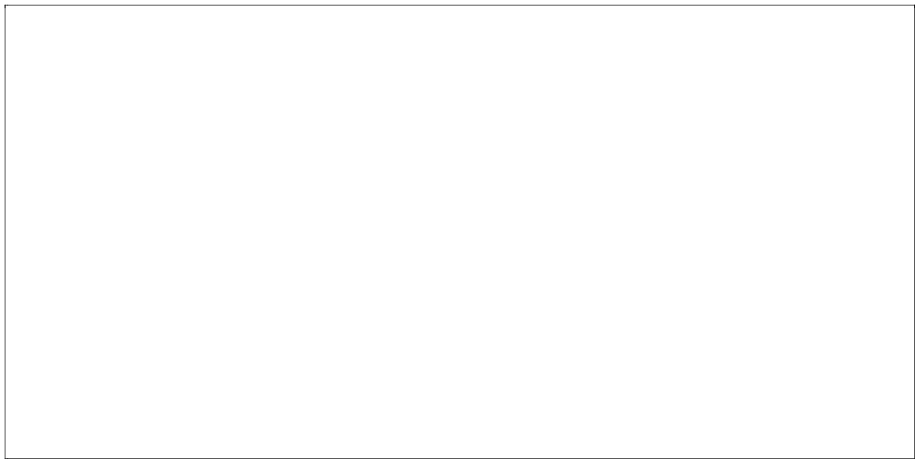
(ii) Use a ruler to continue the tessellation, filling in the rest of the space in the rectangle above.

Question 34 continues on page 26

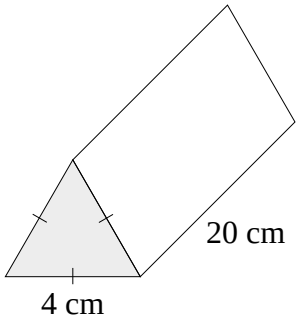
QUESTION 34. (Continued)

(b) A flag is in the shape of a rectangle, as shown below. There is a horizontal stripe going right across the flag exactly in the middle. The width of the stripe is one-fifth the width of the flag.

Accurately draw this stripe on the rectangle below.



(c) A chocolate bar is packed in a box that has the shape of a triangular prism, as shown.



The area of each triangular end is approximately 6·9 cm^2.

(i) What is the surface area of the outside of the box?

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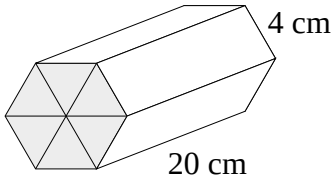
QUESTION 34. (Continued)

(ii) Six of these chocolate bars are boxed together in a hexagonal prism as shown.



What is the surface area of this hexagonal prism?

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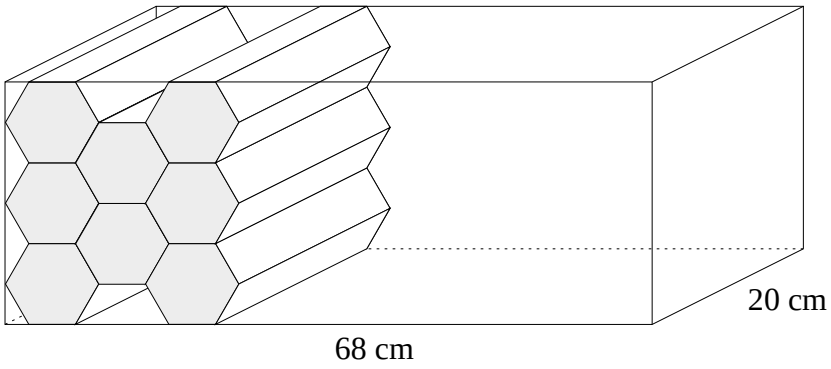
(iii) These hexagonal prisms are packed into a carton, as shown.

The carton is 68 cm long and 20 cm wide.



How many of these hexagonal prisms will fit into the carton?

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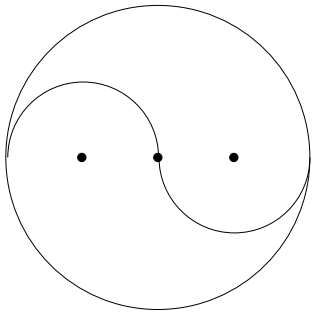
Question 34 continues on page 28

QUESTION 34. (Continued)

(d)



This design is to be enlarged so that the outer circle has radius 4 cm.

Draw the enlarged design accurately in the space below.

EXAMINER'S USE ONLY

Q. 35

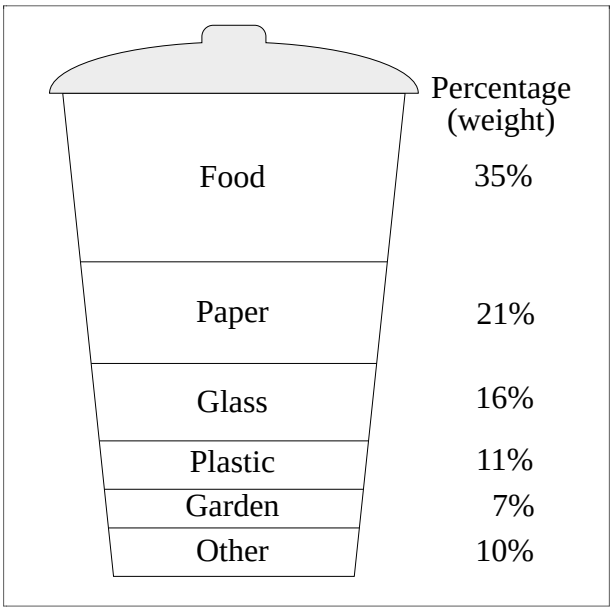
STUDENT NUMBER

CENTRE NUMBER

1996
HIGHER SCHOOL CERTIFICATE EXAMINATION
MATHEMATICS IN PRACTICE
2 UNIT—SECTION II

QUESTION 35. Social Issues

(a) The following diagram shows the percentage composition of the garbage in an average family's garbage bin.



(i) The Jones family's garbage weighs 35 kg.

Use the diagram above to calculate the weight of paper in the Jones's garbage.

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(ii) The local council will recycle paper and glass. Mr Jones takes out all of the paper and glass from the bin.

Use the diagram above to calculate the weight of the remaining garbage.

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Question 35 continues on page 30

QUESTION 35. (Continued)

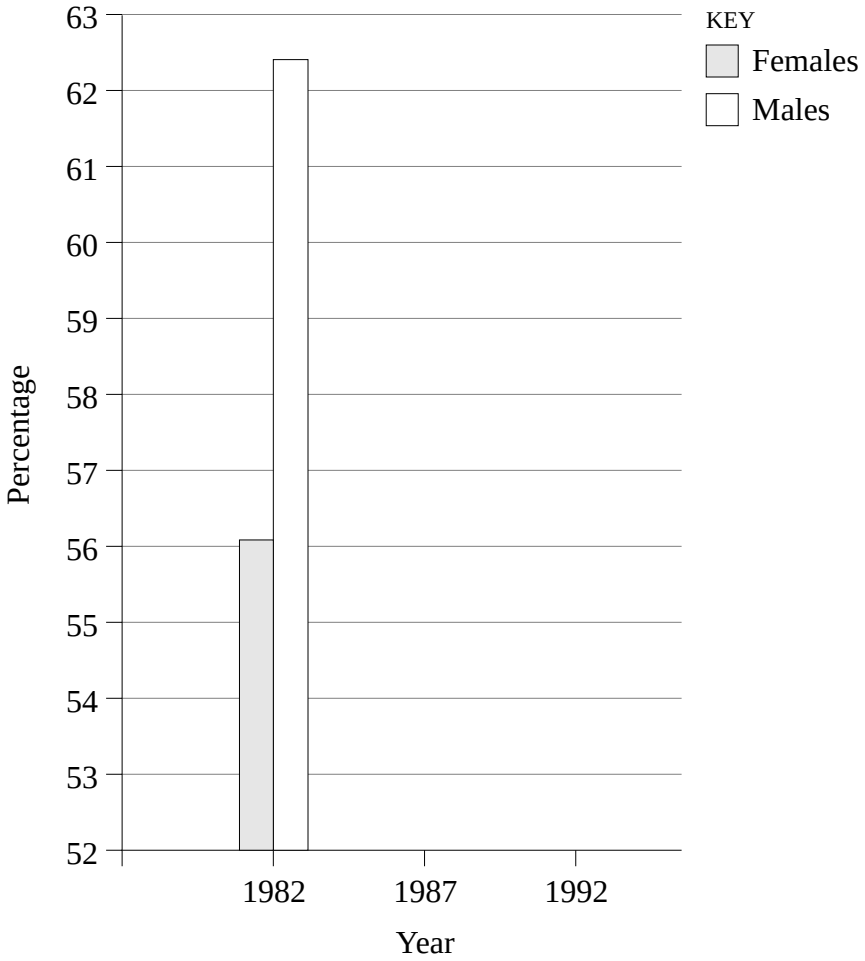
(b) The table below shows the percentage of teenagers who were employed for each of the years indicated.

PERCENTAGE OF 15–19 YEAR OLDS EMPLOYED IN AUSTRALIA			
	1982	*1987*	*1992*
Females	56·1	53·6	54·2
Males	62·4	57·4	54·0

Source: Australian Bureau of Statistics. Cat no 1331.0, 1994.

(i) A column graph showing this information has been started below.

Complete the graph for the percentage of female and male teenagers employed in Australia in the years 1987 and 1992.



QUESTION 35. (Continued)

(ii) Describe the trends shown in your column graph.

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(c) In a pre-poll survey, 2000 people were asked how they would vote.

The results are shown in the table below. All figures are percentages.

	BY GENDER (%)		BY AGE (%)			
	Male	*Female*	*18–24*	*25–39*	*40–54*	*55+*
Labor	37	35	40	42	32	30
Coalition	49	50	43	42	54	59
Democrats		6	5	5	8	5
Greens	3	4	5	4	3	3
Independent	2	3	5	4	2	2
Other	2	2	2	3	1	1

(i) The figure for the percentage of males who said that they would vote for the Democrats is missing from the table. Calculate this figure.

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(ii) There were equal numbers of people in each of the four age groups.

How many people overall said they would vote for the Greens?

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Question 35 continues on page 32

QUESTION 35. (Continued)

(d) Sarah and Patrick were playing a game.

Each had to secretly write down one of the numbers 1, 2, or 3. They then showed the number to each other and found the sum of the two numbers.

(i) Complete the table below to show all the possible sums that could result from this game.

		Sarah		
		1	2	3
Patrick	1			
	2			
	3			

(ii) If the sum was odd, Sarah received 10 cents from Patrick.

If the sum was even, Patrick received 10 cents from Sarah.

Is this a fair game? Give a reason for your answer.

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