Student Name: _____

Teacher's Name:_____

KNOX GRAMMAR SCHOOL

2016

Trial Higher School Certificate Examination

Mathematics General 2

General Instructions

- Reading time – 5 minutes
- Working time – 2.5 hours

- Write using blue or black pen only

- Board approved calculators only

- Draw diagrams in pencil

- A formulae sheet and multiple choice answer sheet are provided

Subject teachers
Mr L Harvey *
Mr Cheah
Ms Tran
Mr Menzies
Mr Zerounian
Ms Lindaya
Mrs Dempsey

Total Marks - 100

Section I   Pages 3 – 16

25 marks

- Attempt questions 1 – 25

- Allow about 35 minutes for this section

Section II   Pages 17 – 35

75 marks
- Attempt questions 26 – 30

- Allow about 1 hour and 55 minutes for this section

This paper MUST NOT be removed from the examination room

Number of Students in Course: 159

MC	Q26	Q27	Q28	Q29	Q30	TOTAL
/25	/15	/15	/15	/15	/15	/100

Section I

Total marks (25)

Attempt Questions 1-25

Allow about 35 minutes for this section

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) 10

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 ◯

Section I

25 marks

Attempt Questions 1 – 25

Allow about 35 minutes for this section

Use the multiple-choice answer sheet for Questions 1 – 25

1. On a school report, a student's record of completing work is graded using the following codes.

    C = consistently

    U = usually

    S = sometimes

    R = rarely

    N = never

    What type of data is this?

    (A)   Categorical, ordinal

    (B)   Categorical, nominal

    (C)   Quantitative, continuous

    (D)   Quantitative, discrete

2. The weights of 10 000 newborn babies in NSW are normally distributed. These weights have a mean of 3.1 kg and a standard deviation of 0.35 kg.

    How many of these newborn babies have a weight between 2.75 kg and 4.15 kg?

    (A)   4985

    (B)   6570

    (C)   8370

    (D)   8385

3.   A camera costs $449, including 12% GST.

What is the price of the camera without GST, correct to the nearest dollar?

(A) $395

(B) $401

(C) $437

(D) $503

4.   Katherine is a childcare worker who earns $640.00 per week. She receives a pay increase of 4% but then decides to reduce the number of hours she works each week. The reduced hours resulted in a decrease of 9% in her weekly pay.

How much is she paid per week after the reduction of hours?

(A) $559.10

(B) $605.70

(C)   S608.00

(D) $725.00

5.   A wildlife officer wishes to determine the number of rabbits on an island. He catches and tags 40 rabbits and releases them. One week later he catches a second sample of 60 rabbits and finds that 8 of them are tagged.

Which of the following is the best estimate for the rabbit population of the island?

(A)   120

(B)   300

(C)   533

(D)   1200

6. Jackson enters into an agreement with a department store to purchase a home theatre package valued at $12 600 with monthly repayments over 2 years. The store charges reducible interest of 8.2% p.a. and sets the monthly repayments at $620.
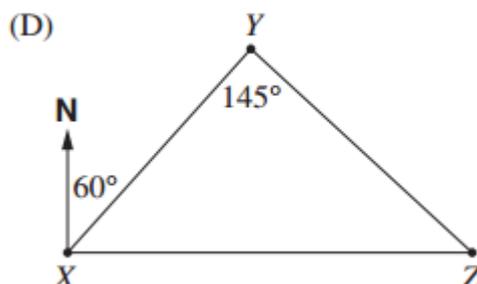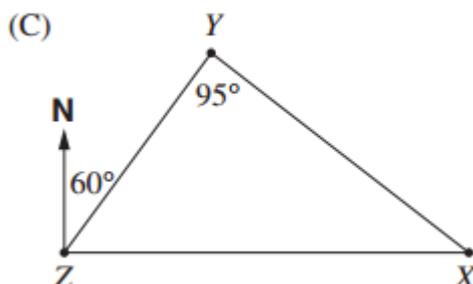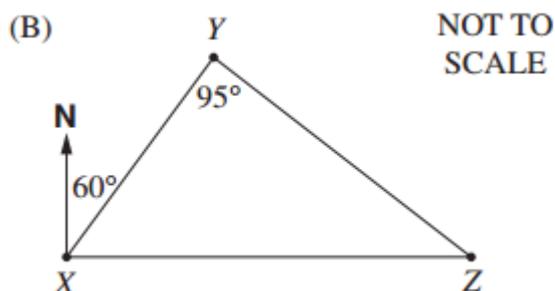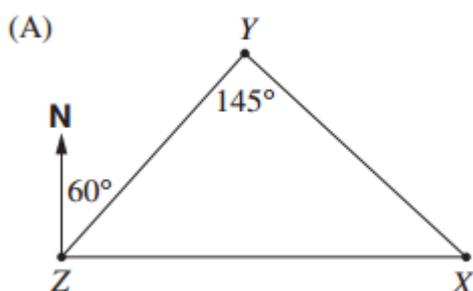
What is the equivalent flat rate of interest being charged for this purchase?

(A)   4.9% p.a.

(B)   8.2% p.a.

(C)   9.0% p.a.

(D)   17.9% p.a.

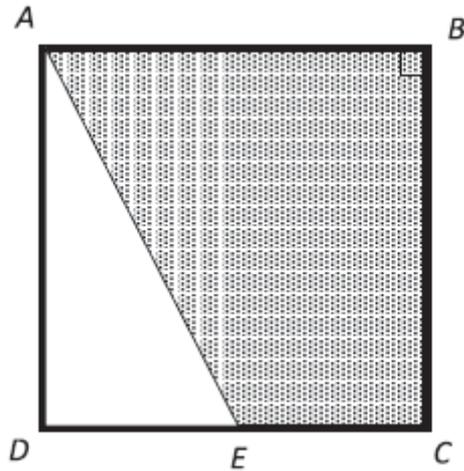7. The following information is given about the location of three towns X, Y and Z:

- X is due east of Z
- X is on a bearing of $145°$ from Y
- Y is on a bearing of $060°$ from Z

Which diagram best represents this information?

(A)   Y, 145°, N, 60°, Z, X

(B)   Y, 95°, N, 60°, X, Z   NOT TO SCALE

(C)   Y, 95°, N, 60°, Z, X

(D)   Y, 145°, N, 60°, X, Z

8. The square *ABCD* has a perimeter of 36 cm.

The point *E* is the midpoint of the edge *DC* of the square. What is the perimeter, in centimetres, of the shaded trapezium?

(A) 21.7 cm

(B) 22.5 cm

(C) 31.5 cm

(D) 32.6 cm

9. The number of 'standard drinks' in various glasses of wine is shown.

Number of standard drinks

White Wine		Red Wine	
small glass	large glass	small glass	large glass
0.9	1.4	1.0	1.5

A woman weighing 62 kg drinks three small glasses of white wine and two large glasses of red wine between 8pm and 1 am.

What would her blood alcohol content (BAC) estimate at 1 am, correct to three decimal places.

(A)   0.030

(B) 0.037

(C) 0.046

(D) 0.057

10.   Which of the following represents the correct solution to this pair of simultaneous equations?

$$2x + y = 8$$
$$x - y = 1$$

(A) $x = 4$ and $y = 3$

(B) $x = 2$ and $y = 4$

(C) $x = 3$ and $y = 2$

(D) $x = 2$ and $y = 3$

11.   Researchers have found a correlation between the lengths of the legs of puppies and their running speed.

The mean and standard deviations are shown below.

	Mean	Standard Deviation
Leg length	$\bar{x} = 10.2$	$\sigma_x = 1.5$
Running speed	$\bar{y} = 1.6$	$\sigma_y = 2.0$

The least squares line of best fit is drawn and the gradient of this line is 0.4.

Which of the following is closest to the value of r, the correlation coefficient?

(A)   0.06

(B)   0.30

(C)   0.53

(D)   2.55

12.   Brady has 16 GB of data storage space available on his computer.

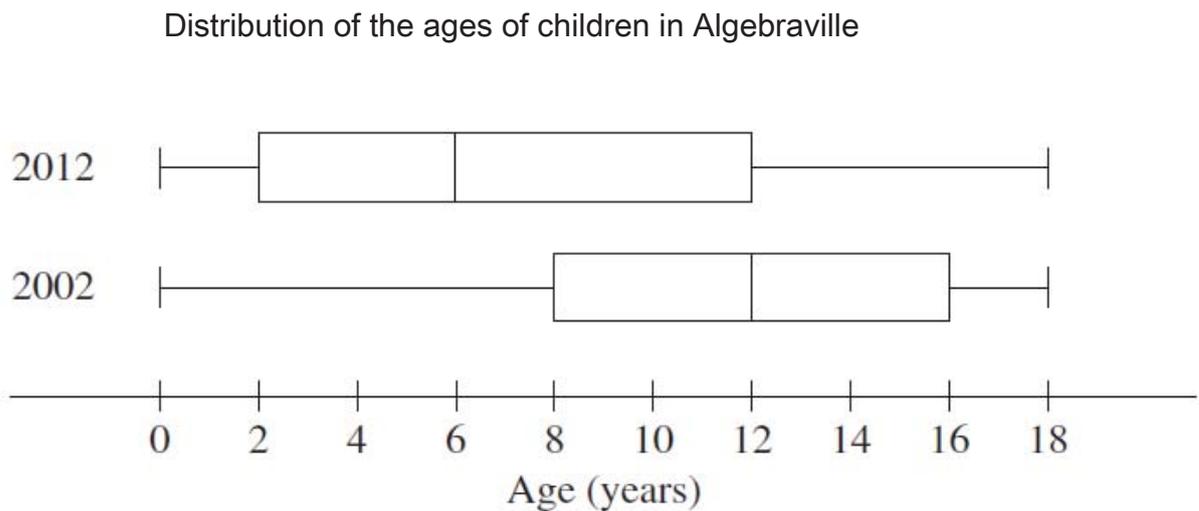Approximately how many files of average size of 7.2 MB can he store?

(A)   450

(B)   461

(C)   2222

(D)   2275

13. What is $\dfrac{6x^2 y}{3} \div \dfrac{2y}{5}$ expressed in its simplest form?

(A) $5x^2$

(B) $30x^2 y$

(C) $\dfrac{1}{5x^2}$

(D) $\dfrac{5}{4x^2 y^2}$

14. The box-and-whisker plot shows the distribution of the ages of children in Algebraville in 2002 and 2012.

Distribution of the ages of children in Algebraville

In 2002 Algebraville had 1950 children aged 0 – 18 years. The number of children aged 12 – 18 years was the same in both 2002 and 2012.

How many children aged 0 – 18 years were there in Algebraville in 2012?

(A) 1950

(B) 2600

(C) 2625

(D) 3900

15. A hospital patient is given 1.2 litres of fluid over 10 hours by intravenous drip. The fluid is delivered at a rate of 20 drops per mL.

What is the required drip rate, in drops per minute?

(A)   0.1

(B)   2.4

(C)   10

(D)   40

16. The formula $b^2 = a^2(e^2 - 1)$ is used to find the positive value of eccentricity, e, of a hyperbola.
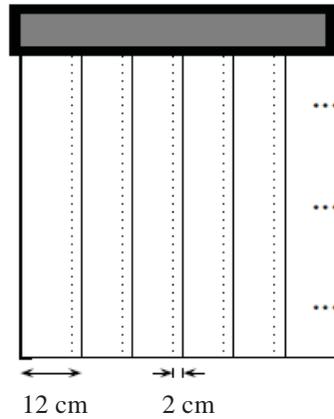
Which of the following correctly expresses e as the subject?

(A) $\sqrt{\dfrac{b^2}{a^2} + 1}$

(B) $\sqrt{\dfrac{b^2 + 1}{a^2}}$

(C) $\dfrac{b}{a} + 1$

(D) $\sqrt{b^2 - a^2 + 1}$

17. A sample of three players is to be taken from a football team of eleven players. How many samples are possible?

(A) $\dfrac{11^3}{3^3}$

(B) $\dfrac{11!}{3!}$

(C) $\dfrac{11 \times 10 \times 9}{3 \times 2 \times 1}$

(D) $11 \times 10 \times 9$

18. Vertical blinds 12 cm wide overlap by 2 cm when they are closed.

12 cm   2 cm

Which of the following expressions represents the width, in centimetres, covered by n blinds when they are closed?

(A) $10n + 2$

(B) $10n - 2$

(C) $12n$

(D) $12n - 2$

19. The area of the triangle shown is 250 cm^2.

30 cm   44°   NOT TO SCALE

x cm

28 cm
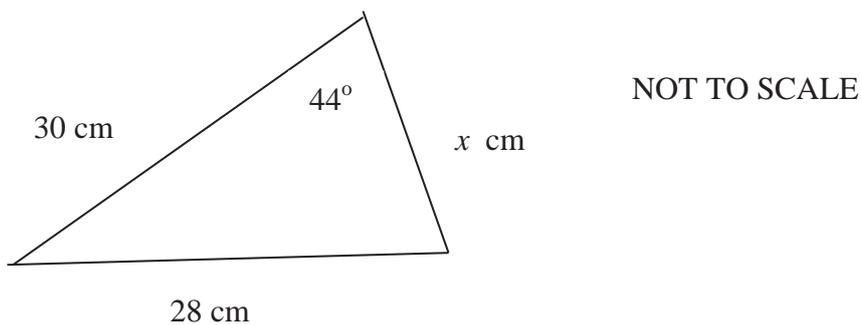
What is the value of x, correct to the nearest whole number?

(A)   11

(B)   12

(C)   22

(D)   24

20.   James collects data from two groups of runners. Both sets of data are normally distributed and displayed in the graphs below. Graph P shows the weights in kilograms of the long distance running team members, and Graph Q shows the weight of the 100 metres track running team members.

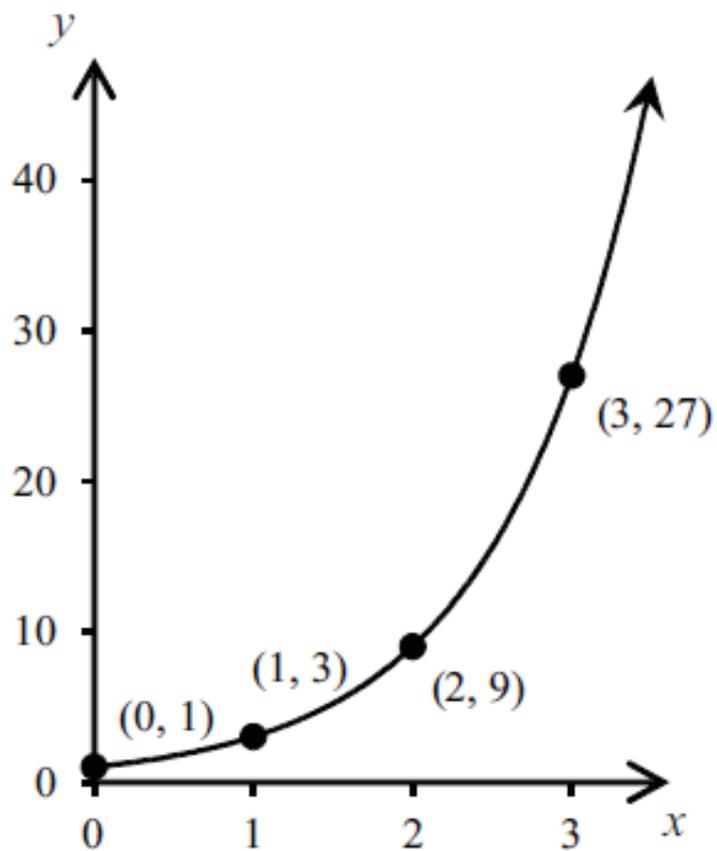**Weights of Long Distance & Track Runners**

Weight in kilograms
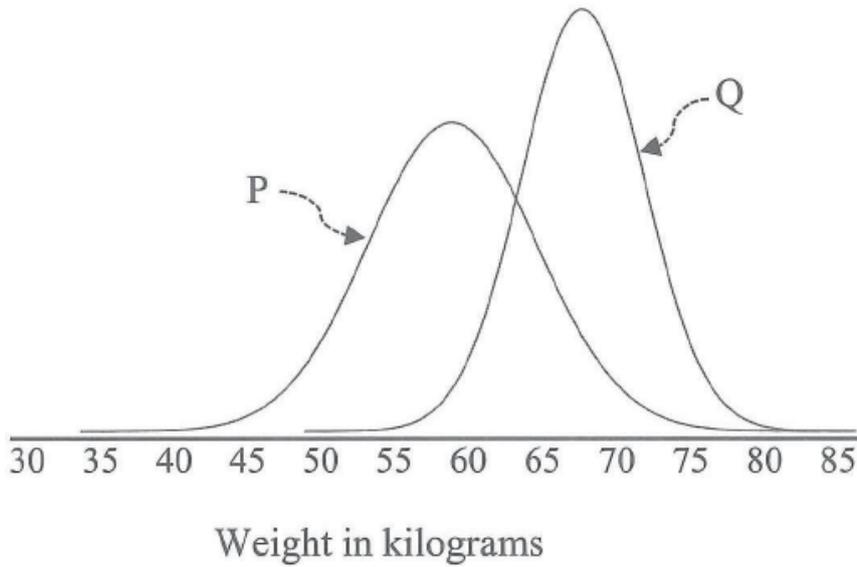
Which of the following statements is true?

(A)   P has the greater standard deviation

(B)   P has the larger mode

(C)   The mean of P is greater than the mean of Q

(D)   Q is negatively skewed

21.   The following is the graph of a relationship between two quantities x and y.

What type of function would accurately model this data?

(A)   hyperbolic

(B)   exponential
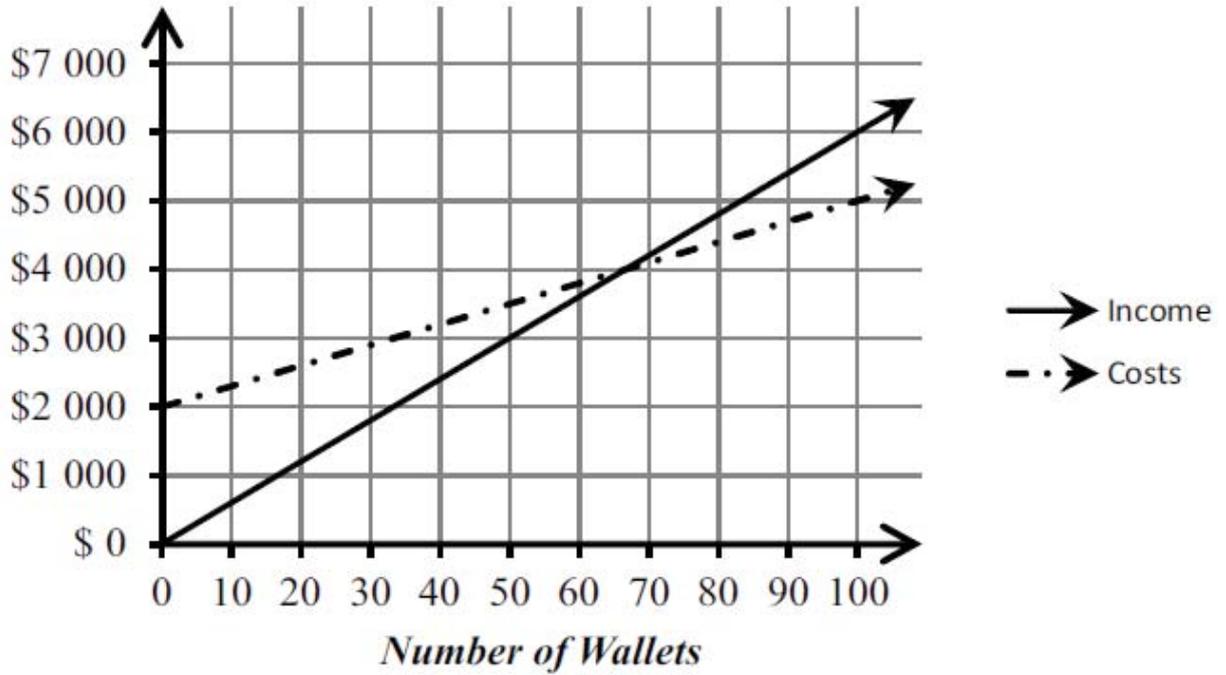
(C)   quadratic

(D)   cubic

22. A circular grass field has a diameter of 30 metres. There is a concrete rectangle in the middle with a length of 21 metres and a width of 13 metres, as shown in the diagram below.
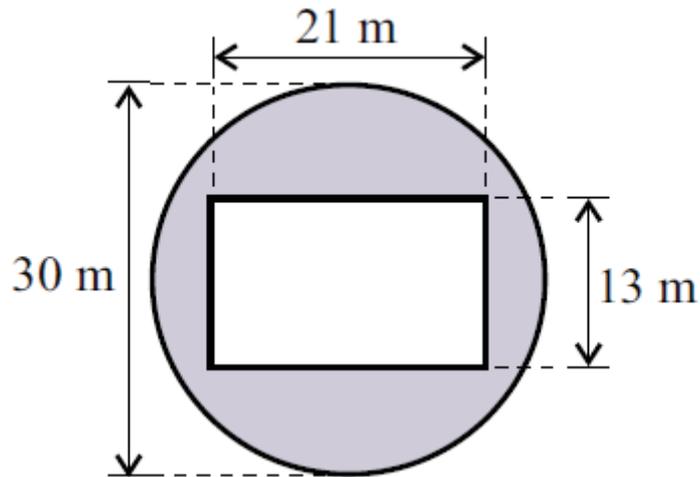
Which of the following would correctly calculate the area of the grass, in square metres, as shaded in the diagram?

(A)   Area $= 2 \times \pi \times \left(\dfrac{30}{2} \right) - 21 \times 13$

(B)   Area $= 2 \times \pi \times 30 - 21 \times 13$

(C)   Area $= \pi \times \left(\dfrac{30}{2} \right)^2 - 21 \times 13$

(D)   Area $= \pi \times 30^2 - 21 \times 13$

23. Jack manufactures leather wallets. The following graph models the cost and income for his business.

Which of the following is not correct?

(A)   Jack's set-up costs are $2000.

(B)   Once he has set up his business, each wallet costs $30 to manufacture.

(C)   He sells each wallet for $60.

(D)   Jack will make a profit if he manufactures 60 wallets

24. This diagram shows a radial survey of a park.

D
314°

101 m

N

A
060°

96 m

O

83 m

75 m

C
225°

B
142°
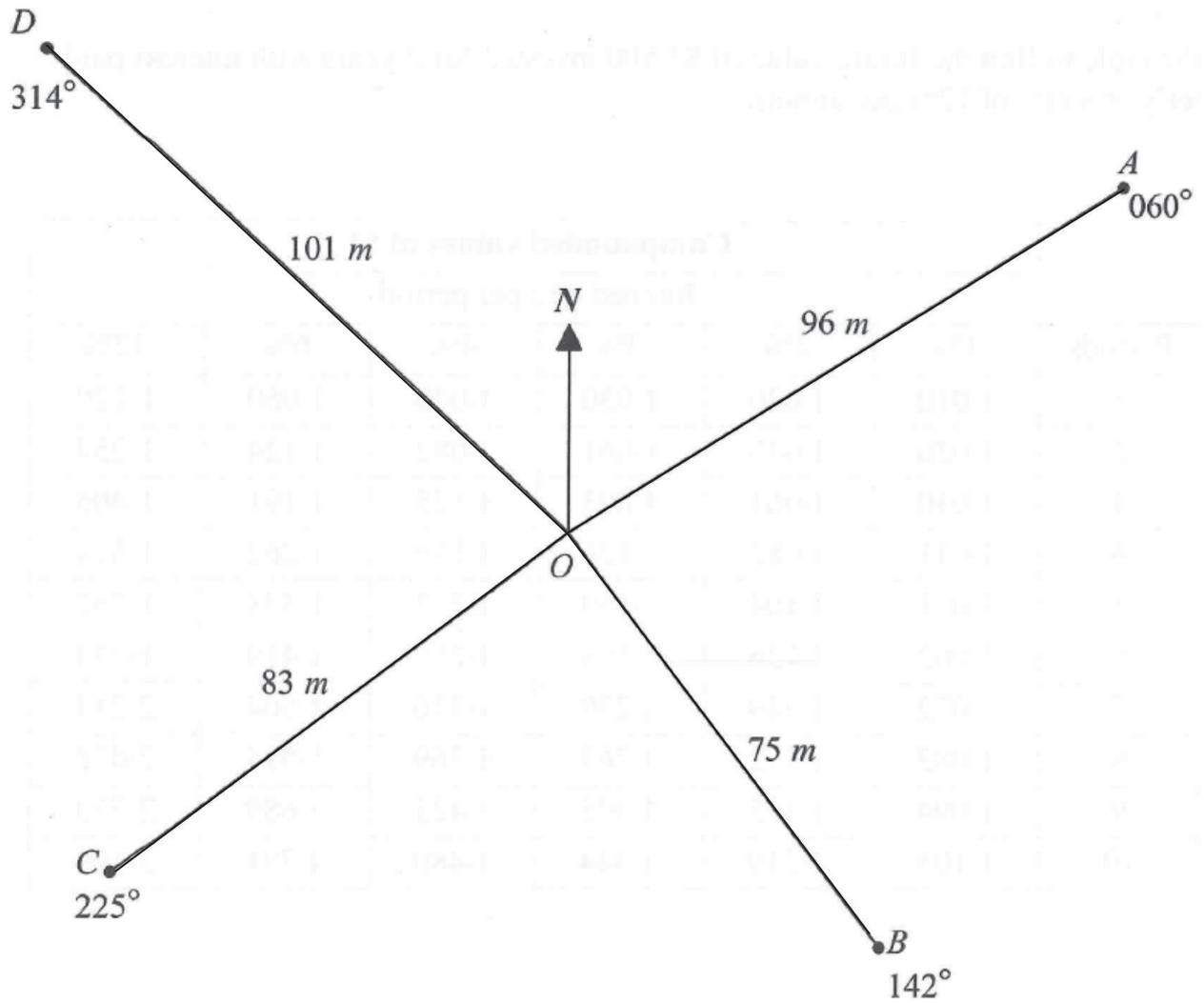
Which of the following is closest to the area of the triangular region *AOB*?

(A) 1002 m^2

(B) 3565 m^2

(C) 4660 m^2

(D) 7130 m2

25. An insurance company offers customers the following discounts on the basic annual premium for car insurance.

Type of discount	Discount
Multi-policy discount (Owner has more than 2 insurance policies with the company)	15%
No-claim bonus (Owner has had at least 5 years without an insurance claim)	20%
Combined CTP and comprehensive insurance (Owner has both insurances with the company)	$50

If a customer is eligible for more than one discount, subsequent discounts are applied to the already discounted premium. The combined compulsory third party (CTP) and comprehensive insurance discount is always applied last.

Lachlan has three insurances policies, including CTP and comprehensive insurance, with the company. He has used this company for 8 years and he has never made a claim.

The basic annual premium for his car insurance is $870.

How much will Lachlan need to pay after the discounts are applied?

(A) $482.44

(B) $515.50

(C) $541.60

(D) $557.60

End of Section I

Section II

75 marks
Attempt Questions 26 – 30
Allow about 1 hour and 55 minutes for this section

Answer all questions in the spaces provided.

Your responses should include relevant mathematical reasoning and/or calculations.

Extra writing space is provided on page 36. If you use this space, clearly indicate which question you are answering.

QUESTION 26   (15 marks)

(a)   How long does it take to upload a 15.6 MB file with a transfer rate of 180 kbps? Answer correct to the nearest minute.

2

_____

_____

_____

_____

_____

_____

(b)   Harry buys a motor vehicle that depreciates at a rate of 12.5% per annum. After four years the motor vehicle has a salvage value of $13 000.

2

How much did Harry pay for the motor vehicle? Answer to the nearest dollar.

_____

_____

_____

_____

_____

_____

_____

Question 26 continued

(c)   Liam's recent results in task 1 and task 2 are recorded in the table below.

	Class mean	Class standard deviation	Liam's results
Task 1	58	8	82
Task 2	58	12	82

(i)   What is Liam's z-score for task 2?   **1**

_____

_____

_____

_____

(ii)   Explain the z-score in task 2 in terms of the class mean and standard deviation.   **1**

_____

_____

_____

_____

(iii)   What mark for task 1 would be equivalent to a z-score of -2?   **1**

_____

_____

_____

_____

Question 26 continued

(d)   The table below shows the present value of a $1 annuity.

Period	1%	2%	4%	6%	8%	10%
1	0.9901	0.9804	0.9615	0.9434	0.9259	0.9091
2	1.9704	1.9416	1.8861	1.8334	1.7833	1.7355
3	2.9410	2.8839	2.7751	2.6730	2.5771	2.4869
4	3.9020	3.8077	3.6299	3.4651	3.3121	3.1699
5	4.8534	4.7135	4.4518	4.2124	3.9927	3.7908

(i)   What is the present value of a $60 000 per year annuity at 2% per annum for   **1**
five years, with interest compounding annually?

_____

_____

_____

(ii)   An annuity of $8000 is invested every three months at 4% per annum, compounded
quarterly for one year.

What is the present value of the annuity?

1

_____

_____

_____

(iii)   What is the value of an annuity that would provide a present value of $38 656.50   **1**
after three years at 8% per annum compound interest?

_____

_____

_____

_____

Question 26 continued

(e)   William borrowed $236 000 at an interest rate of 5.4% per annum, compounded monthly.
        The repayments have been set at $1200 per month.

Months (n)	Principal (P)	Interest (I)	Repayment (R)	Balance (P+I-R)
1	$236 000	$1062	$1200	
2			$1200	

(i)   Explain, using a suitable calculation, why the interest charged for the first month   **1**
        is $1062.

(ii)   How much is owed at the end of the second month?

                                                                                               2

Question 26 continued

(f)   A family currently pays \$480 for some groceries.

Assuming a constant annual inflation rate of 2.5%, calculate how much would be paid for   **2**
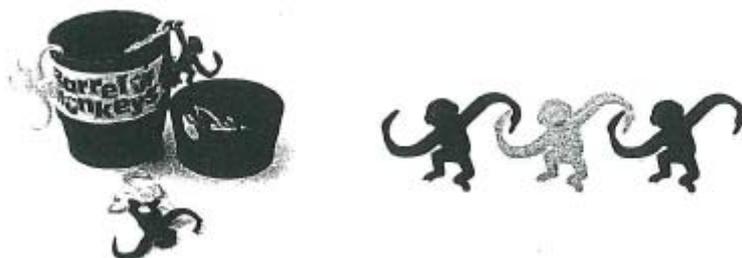the same groceries in 4 years' time. Give answer to the nearest cent.

_____

_____

_____

_____

_____

_____

End of Question 26

QUESTION 27   **(15 marks)**

(a)   A barrel of 15 plastic toy monkeys has 7 red, 5 yellow and 3 green.

Three of these monkeys when taken out of the barrel are linked, as shown.

Giving answers as fractions,

(i)   What is the probability that the first monkey in the link is red?   **1**

_____

(ii)   What is the probability that the first two linked monkeys are either both red   **2**
or both green?

_____

_____

_____

_____

(iii)   If the three monkeys are of different colours, in how many ways can they   **1**
be linked?

_____

_____

(iv)   What is the probability that all 3 linked monkeys are of different colours?   **2**

_____

_____

_____

_____

Question 27 continued

(b)   At a particular time during the day, a tower of height 19.2 metres casts a shadow.
At the same time, a person who is 1.65 metres tall casts a shadow 5 metres long.

NOT TO
SCALE

19.2 m

1.65 m

5 m

Shadow of tower

x
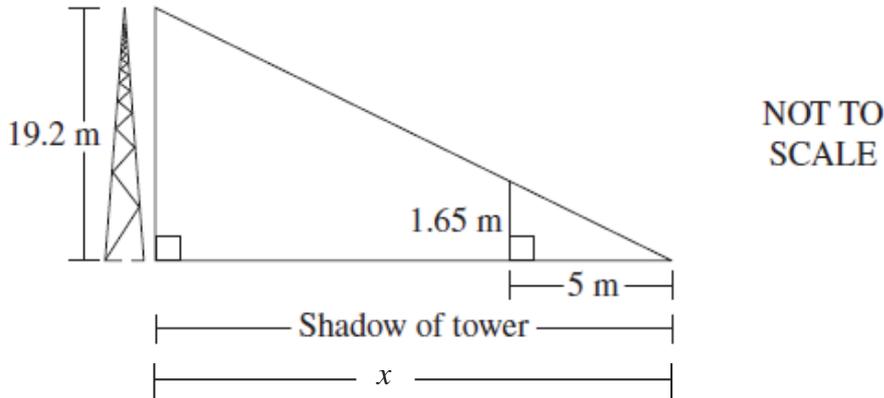
What is the length of the shadow cast by the tower at that time? Give answer correct to
one decimal place.

2

(c)   Nicholas has been offered a job by two different sales companies.

Company A	12% commission on total sales.
Company B	$500 per fortnight retainer plus 5% commission on all sales.

Both companies have told Nicholas that his expected sales will be $7250.

Which company will pay Nicholas the greater amount? Support your answer with appropriate
mathematical calculations.

2

Question 27 continued

(d)   The following cumulative frequency histogram represents the runs Steve Smith gained in six matches in a One Day International Series

Cumulative Frequency Histogram

NOT TO SCALE

Cumulative Frequency

231
194
147
45   45
5

1   2   3   4   5   6
Number of Matches
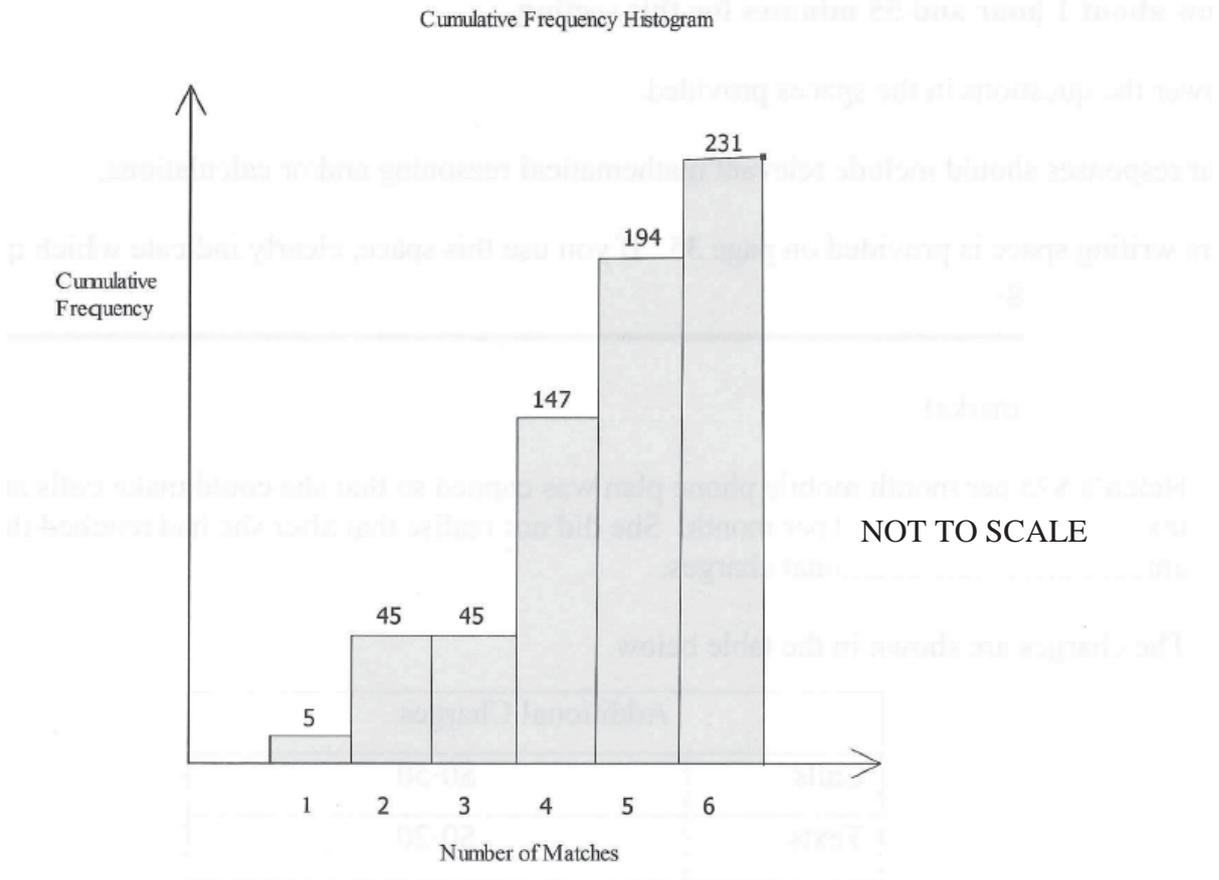
(i)   Give a reason why the cumulative frequency for match 3 is the same as the cumulative frequency for match 2.

1

_____

_____
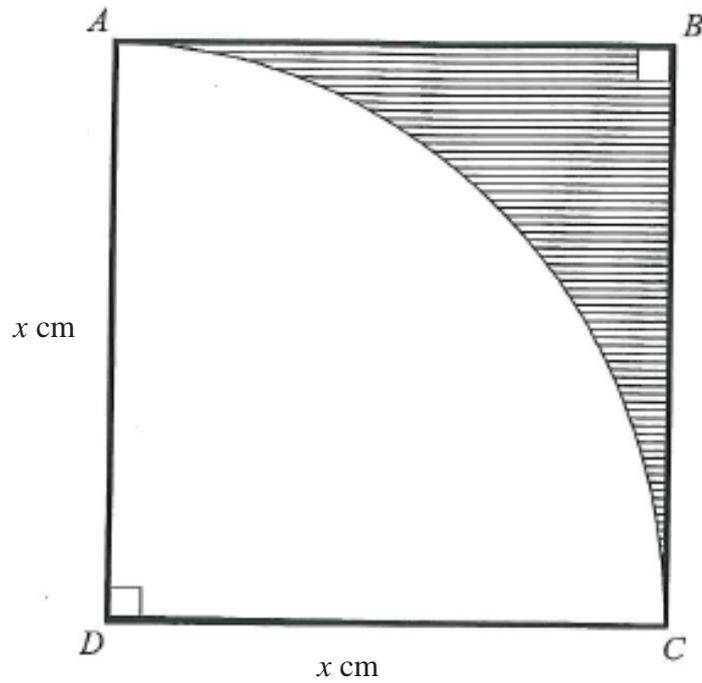
(ii)   How many runs did Steve score in the fourth match?

1

_____

_____

(iii)   What was Steve Smith's average run score over the International series?

1

_____

_____

_____

Question 27 continued

(e)   A sector *ACD* with radius *x* cm and centre *D*, is cut from a square *ABCD*, as shown in the diagram.

2

Show that the area of the shaded section *ABC* can be given by $\dfrac{x^2(4-\pi)}{4}$ cm^2.

_____

_____

_____

_____

_____

_____

End of Question 27

Question 28   **(15 Marks)**

(a)   A company's cost ($C) equation for the manufacture of *n* items is given by:

$$\$C = 2350 + 200n$$

The income ($I) received from the sale of these items is given by:

$$\$I = 250n$$

(i)   Show that the equation for the company's profit ($P) from the sale of the items can be given by: **2**

$$\$P = 50n - 2350$$

(ii)   How many items must the company sell in order to break even?   **2**

(iii)   Calculate the profit the company makes from the sale of 120 items.   **1**

(iv)   Using the information in (i), (ii) and (iii), draw the graph of the profit equation in the space below, labelling all relevant details.   **2**

$

0

Number of items
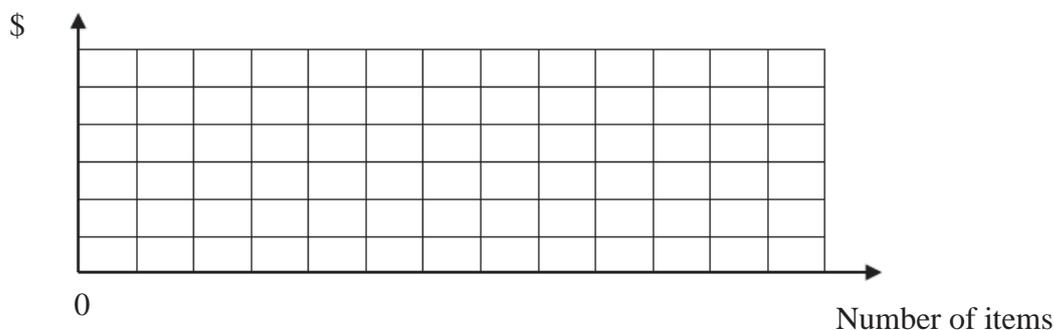
(v)   Explain what the gradient of the graph represents.   **1**

Question 28 continues on page 27

- 26 -

Question 28 continued

(b)   Solve these equations simultaneously to find the value of *x* and *y*.   **3**

$$x - y = 7$$
$$3x + 4y = 14$$

_____

_____

_____

_____

_____

_____

_____

_____

_____

(c)   Perth in Western Australia is 8 hours ahead of Greenwich in England. Santiago in Chile is 3 hours behind Greenwich.

What is the day and time in Perth when it is 10pm on Thursday in Santiago?   **2**

_____

_____

_____

_____

_____

_____

_____

Question 28 continued

(d) Peter and Samantha buy a family car priced at $55 000. In addition to the purchase price, there are the following costs.

- Dealer delivery charges $1995
- Compulsory third-party insurance $748
- Registration $323
- Comprehensive car insurance $920
- Stamp duty, calculated at

    3% of the car value up to and including $45 000

   plus 5% of the car value over $45 000

(i) Calculate the stamp duty paid on the purchase of this car.   **1**

_____

_____

_____

(ii) Hence find the total amount that Peter and Samantha will need to pay. **1**

_____

_____

_____

End of Question 28

Question 29   **(15 Marks)**

(a)   Solve the equation $\dfrac{5x+2}{3} = 4 - 2x$.

2

(b)   When a force is applied to a certain object, its acceleration (a) varies inversely as its mass (m). When the acceleration of an object 12 m/s^2, the corresponding mass is 3 kg.

     (i)   Find the constant of variation

1

     (ii)   Find the acceleration of a 1.5 kg object.

1

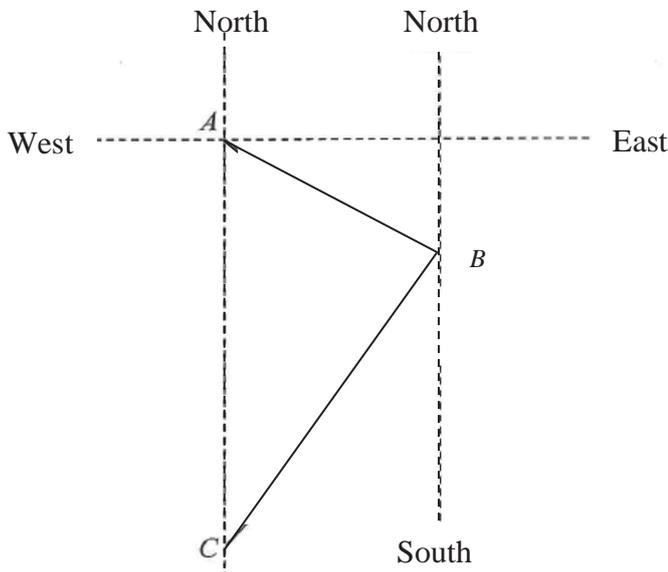   (iii)   Find the mass of an object when the acceleration is 6 m/s^2.

1

(c)   Elliot walks 2.5 km from *A* to *B* on a bearing of 110°. He then walks 6.9 km from *B* to *C* on a bearing of 200°.

C is due south of A.

The diagram below shows the positions of *A, B* and *C*.

NOT TO SCALE

(i)   On the diagram, insert the distances Elliot walked and show the two given bearings.   **2**

(ii)   What is the size of $\angle BAC$?   **1**

_____

_____

(iii)   Show that the bearing of *B* from *C* is 020°.   **1**

_____

_____

_____

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

_____

_____

_____

(v)   How far (correct to one decimal place) is *C* south of *A*?   **2**

(d)   Two cities *A* and *Y* are located on the equator, as shown in the diagram of the Earth's surface.
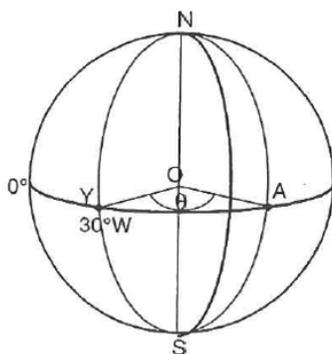
(i)   Write down the co-ordinates of city *Y*.   **1**

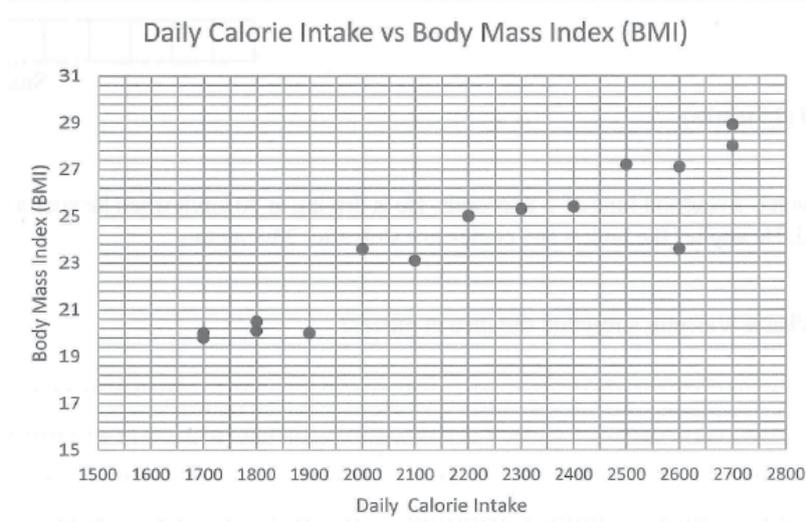(ii)   The distance between city *Y* and city *A* is approximately 5000km.

Show that θ (angle AOY) is approximately 45°.   **2**

End of Question 29

Question 30   **(15 marks)**

(a)

The scatterplot shows the relationship between the daily Calorie Intake and Body Mass Index (BMI) for a group of 15 adults.

(i)   The correlation coefficient for the data is 0.93.

Explain what the correlation coefficient indicates about the relationship between daily calorie intake and BMI for these adults.   **1**

_____

_____

_____

(ii)   The table below shown the mean and standard deviation for calorie intake and body mass index.

	Mean	Standard Deviation
Daily Calorie Intake (x)	2 200	357·77
Body Mass Index (BMI) (y)	23·84	3·08

Using the above information find the equation of the least-squares line of best fit.   **3**

_____

_____

_____

_____

_____

_____

_____

Question 30 continued

(iii)   Explain why the equation of the least-squares line would NOT be reliable for predicting the BMI of a person who consumes 5000 calories daily? **1**

_____

_____

_____

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_____

(b)   Angus is driving on a motorway at a speed of 90 kilometres an hour and has to brake suddenly. He has a reaction time of 2 seconds and a braking distance of 59.2 metres.
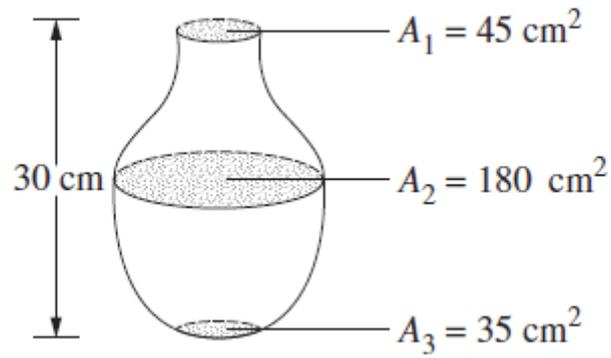
Calculate his stopping distance. **2**

_____

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Question 30 continued

(c)   Three equally spaced cross-sectional areas of the vase are shown.

Use Simpson's rule to find the approximate capacity of the vase in litres.

3

_____

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Question 30 continued

(d)   Jack and Will each sat twenty class tests. Jack's results on the test are displayed in the box-and-whisker plot shown in part (i).
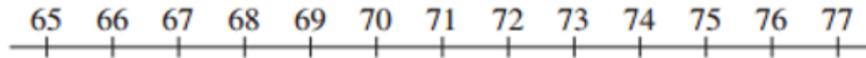
(i)   Will's 5 number summary for the tests is   67, 69, 71, 73, 75

Draw a box-and-whisker plot to display to display Will's result below that of Jack's results.   **1**

Jack

Will

65 66 67 68 69 70 71 72 73 74 75 76 77

(ii)   What percentage of Jack's results were below 69?   **1**

_____

(iii)   Jack claims that his results were better than Will's. Is he correct? Justify your answer by referring to the summary statistics and skewness of the distributions.   **3**

_____

_____

_____

_____

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_____

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_____

End of paper

Section II   Extra writing paper

Student Name: _SOLUTIONS_

Teacher's Name: _____

KNOX GRAMMAR SCHOOL

2016

Trial Higher School Certificate Examination

Mathematics General 2

General Instructions

- Reading time – 5 minutes
- Working time – 2.5 hours

- Write using blue or black pen only

- Board approved calculators only

- Draw diagrams in pencil

- A formulae sheet and multiple choice answer sheet are provided

Subject teachers
Mr L Harvey *
Mr Cheah
Ms Tran
Mr Menzies
Mr Zerounian
Ms Lindaya
Mrs Dempsey

This paper MUST NOT be removed from the examination room

Total Marks - 100

Section I   Pages 3 – 16 p

25 marks

- Attempt questions 1 – 25

- Allow 35 minutes for this section

Section II   Pages 17 – 35

75 marks

- Attempt questions 26 – 30

- Allow about 1 hour and 55 minutes for this section

Number of Students in Course: 158

MC	Q26	Q27	Q28	Q29	Q30	TOTAL
/25	/15	/15	/15	/15	/15	/100

Section I

Total marks (25)

Attempt Questions 1-25

Allow about 35 minutes for this section

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) 10

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 ○

Section I

25 marks

Attempt Questions 1 – 25

Allow about 35 minutes for this section

Use the multiple-choice answer sheet for Questions 1 – 25

1. On a school report, a student's record of completing work is graded using the following codes.

   C = consistently
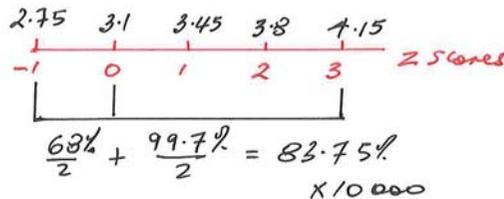   U = usually
   S = sometimes
   R = rarely
   N = never

   What type of data is this?

   (A) Categorical, ordinal
   (B) Categorical, nominal
   (C) Quantitative, continuous
   (D) Quantitative, discrete

2. The weights of 10 000 newborn babies in NSW are normally distributed. These weights have a mean of 3.1 kg and a standard deviation of 0.35 kg.

   How many of these newborn babies have a weight between 2.75 kg and 4.15 kg?

   (A) 4985
   (B) 6570
   (C) 8370
   (D) 8385

   Handwritten working:
   2.75 3.1 3.45 3.8 4.15
   −1   0   1   2   3   z scores

   $\frac{68\%}{2} + \frac{99.7\%}{2} = 83.75\%$
   × 10 000

3. A camera costs \$449, including 12% GST.

   What is the price of the camera without GST, correct to the nearest dollar?

   (A) \$395
   (B) \$401
   (C) \$437
   (D) \$503

   Handwritten working:
   112% of PRICE = \$449   (÷112)
   1% of PRICE = \$4.0089
   100% of PRICE = \$400.89

4. Katherine is a childcare worker who earns \$640.00 per week. She receives a pay increase of 4% but then decides to reduce the number of hours she works each week. The reduced hours resulted in a decrease of 9% in her weekly pay.

   How much is she paid per week after the reduction of hours?

   (A) \$559.10
   (B) \$605.70
   (C) \$608.00
   (D) \$725.00

   Handwritten working:
   \$640 × 104% × 91% = \$605.70

5. A wildlife officer wishes to determine the number of rabbits on an island. He catches and tags 40 rabbits and releases them. One week later he catches a second sample of 60 rabbits and finds that 8 of them are tagged.

   Which of the following is the best estimate for the rabbit population of the island?

   (A) 120
   (B) 300
   (C) 533
   (D) 1200

   Handwritten working:
   $\frac{N}{40} = \frac{60}{8}$

   $N = \frac{60}{8} \times 40$

   = 300

6. Jackson enters into an agreement with a department store to purchase a home theatre package valued at $12 600 with monthly repayments over 2 years. The store charges reducible interest of 8.2% p.a. and sets the monthly repayments at $620.

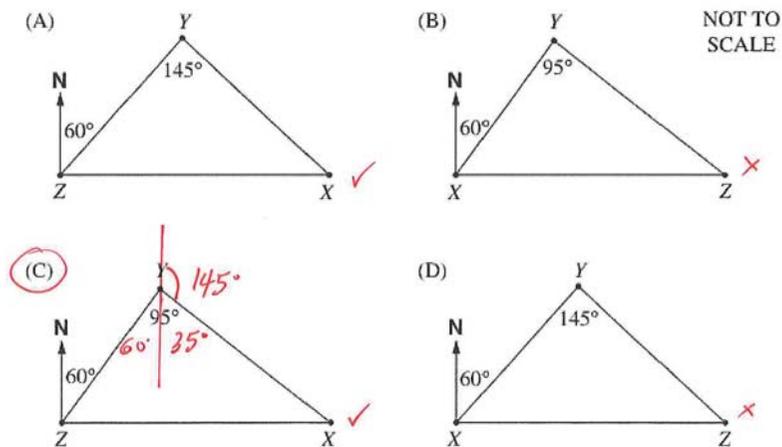What is the equivalent flat rate of interest being charged for this purchase?

(A) 4.9% p.a.

(B) 8.2% p.a.

(C) 9.0% p.a. *(circled)*

(D) 17.9% p.a.

Handwritten:
$$\$620 \times 24 = 14880$$
$$INT = 14880 - 12600$$
$$= \$2280$$
$$2280 = 12600 \times R \times 2$$
$$R = \frac{2280}{12600 \times 2}$$
$$= 0.0904$$
$$\text{Rate} = 9.0\% \, p.a.$$

7. The following information is given about the location of three towns X, Y and Z:

- X is due east of Z
- X is on a bearing of 145° from Y
- Y is on a bearing of 060° from Z

Which diagram best represents this information?

(A)

(B)   NOT TO SCALE

(C) *(circled)*

(D)

8. The square $ABCD$ has a perimeter of 36 cm.

Handwritten:
$$AE = \sqrt{9^2 + 4.5^2}$$
$$= 10.0623$$
$$P = 9 + 9 + 4.5 + 10.06$$
$$= 32.56$$

The point E is the midpoint of the edge DC of the square. What is the perimeter, in centimetres, of the shaded trapezium?

(A) 21.7 cm

(B) 22.5 cm

(C) 31.5 cm

(D) 32.6 cm *(circled)*

9. The number of 'standard drinks' in various glasses of wine is shown.

Number of standard drinks

White Wine		Red Wine	
small glass	large glass	small glass	large glass
0.9	1.4	1.0	1.5

Handwritten: ×3 =2.7 ; ×2 = 3

A woman weighing 62 kg drinks three small glasses of white wine and two large glasses of red wine between 8pm and 1 am.

What would her blood alcohol content (BAC) estimate at 1 am, correct to three decimal places.

(A) 0.030

(B) 0.037

(C) 0.046

(D) 0.057 *(circled)*

Handwritten:
$$BAC_F = \frac{10 \times 5.7 - 7 \times 5}{5.5 \times 62}$$
$$= 0.57$$

10. Which of the following represents the correct solution to this pair of simultaneous equations?

$$2x + y = 8$$
$$x - y = 1$$

(A) $x = 4$ and $y = 3$

(B) $x = 2$ and $y = 4$

(C) $x = 3$ and $y = 2$

(D) $x = 2$ and $y = 3$

Handwritten: $3x = 9$ $x = 3$ $3 - y = 1$ $-y = -2$ $y = 2$

11. Researchers have found a correlation between the lengths of the legs of puppies and their running speed.

The mean and standard deviations are shown below.

	Mean	Standard Deviation
Leg length	$\overline{x} = 10.2$	$s_x = 1.5$
Running speed	$\overline{y} = 1.6$	$s_y = 2.0$

The least squares line of best fit is drawn and the gradient of this line is 0.4.

Which of the following is closest to the value of r, the correlation coefficient?

(A) 0.06

(B) 0.30

(C) 0.53

(D) 2.55

Handwritten: $M = r \times \dfrac{s_y}{s_x}$ $0.4 = r \times \dfrac{2.0}{1.5}$ $r = 0.4 \times \dfrac{1.5}{2.0} = 0.3$

12. Brady has 16 GB of data storage space available on his computer.

Approximately how many files of average size of 7.2 MB can he store?

(A) 450

(B) 461

(C) 2222

(D) 2275

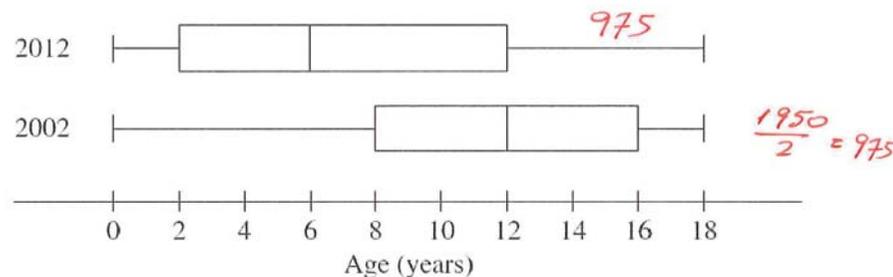*Handwritten:* $\dfrac{16 \times 1024}{7.2} = 2275.555$

13. What is $\dfrac{6x^2 y}{3} \div \dfrac{2y}{5}$ expressed in its simplest form?

(A) $5x^2$

(B) $30x^2 y$

(C) $\dfrac{1}{5x^2}$

(D) $\dfrac{5}{4x^2 y^2}$

Handwritten: $\dfrac{6x^2 y}{3} \times \dfrac{5}{2y} = \dfrac{30x^2 y}{6y} = 5x^2$

14. The box-and-whisker plot shows the distribution of the ages of children in Algebraville in 2002 and 2012.

Distribution of the ages of children in Algebraville

Handwritten: 975 ; $\dfrac{1950}{2} = 975$

In 2002 Algebraville had 1950 children aged 0 – 18 years. The number of children aged 12 – 18 years was the same in both 2002 and 2012.

How many children aged 0 – 18 years were there in Algebraville in 2012?

(A) 1950

(B) 2600

(C) 2625

(D) 3900

Handwritten: $975 \times 4 = 3900$

15. A hospital patient is given 1.2 litres of fluid over 10 hours by intravenous drip. The fluid is delivered at a rate of 20 drops per mL.

What is the required drip rate, in drops per minute?

(A) 0.1

(B) 2.4

(C) 10

(D) 40

$$\frac{1.2 \times 1000 \times 20}{10 \times 60} = 40$$

16. The formula $b^2 = a^2(e^2 - 1)$ is used to find the positive value of eccentricity, e, of a hyperbola.

Which of the following correctly expresses e as the subject?

(A) $\sqrt{\dfrac{b^2}{a^2} + 1}$

(B) $\sqrt{\dfrac{b^2 + 1}{a^2}}$

(C) $\dfrac{b}{a} + 1$

(D) $\sqrt{b^2 - a^2 + 1}$

$b^2 = a^2(e^2 - 1)$

$\dfrac{b^2}{a^2} = e^2 - 1$

$e^2 = \dfrac{b^2}{a^2} + 1$

$e = \sqrt{\dfrac{b^2}{a^2} + 1}$

17. A sample of three players is to be taken from a football team of eleven players. How many samples are possible?

(A) $\dfrac{11^3}{3^3}$

(B) $\dfrac{11!}{3!}$

(C) $\dfrac{11 \times 10 \times 9}{3 \times 2 \times 1}$

(D) $11 \times 10 \times 9$
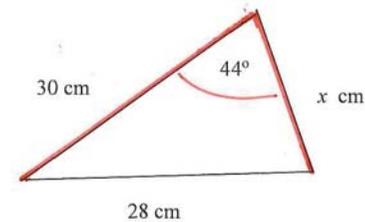
$\dfrac{11 \times 10 \times 9}{3!}$

18. Vertical blinds 12 cm wide overlap by 2 cm when they are closed.
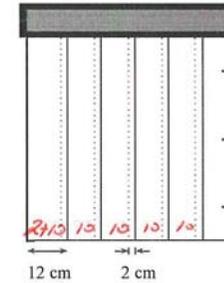
12 cm   2 cm

Which of the following expressions represents the width, in centimetres, covered by n blinds when they are closed?

(A) $10n + 2$

(B) $10n - 2$

(C) $12n$

(D) $12n - 2$

19. The area of the triangle shown is 250 cm².

30 cm   44° x cm   NOT TO SCALE

28 cm

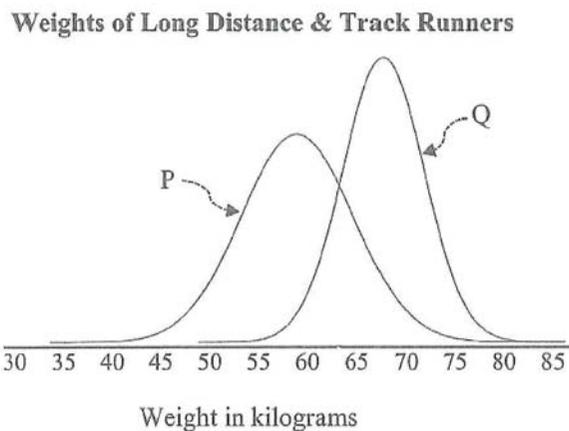What is the value of x, correct to the nearest whole number?

(A) 11

(B) 12

(C) 22

(D) 24

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

$250 = \frac{1}{2} \times 30 \times x \times \sin 44°$

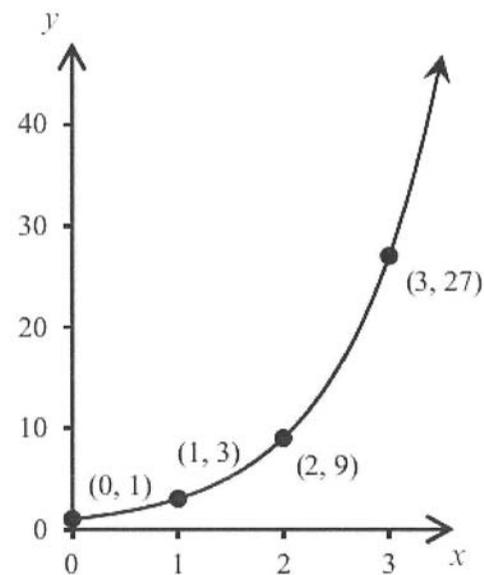$x = \dfrac{250}{\frac{1}{2} \times 30 \times \sin 44°}$

$= 23.99\ldots$

20. James collects data from two groups of runners. Both sets of data are normally distributed and displayed in the graphs below. Graph P shows the weights in kilograms of the long distance running team members, and Graph Q shows the weight of the 100 metres track running team.

Weights of Long Distance & Track Runners

Weight in kilograms

Which of the following statement is true?

(A) P has the greater standard deviation

(B) P has the larger mode

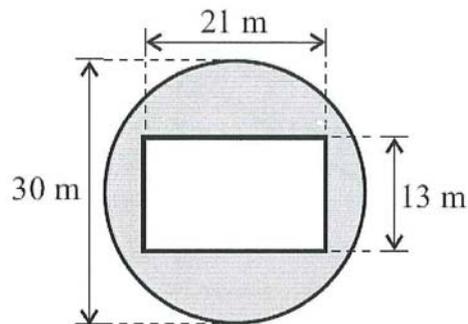(C) The mean of P is greater than the mean of Q

(D) Q is negatively skewed

21. The following is the graph of a relationship between two quantities x and y.

What type of function would accurately model this data?

(A) hyperbolic

(B) exponentail

(C) quadratic

(D) cubic

22. A circular grass field has a diameter of 30 metres. There is a concrete rectangle in the middle with a length of 21 metres and a width of 13 metres, as shown in the diagram below.
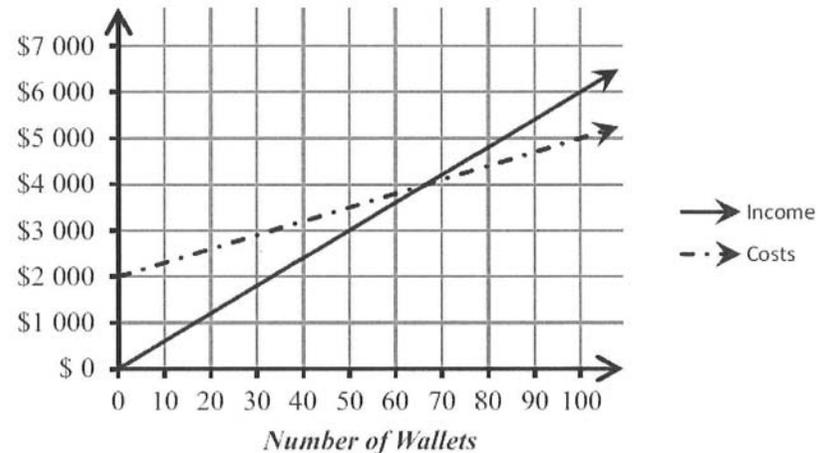

Which of the following would correctly calculate the area of the grass, in square metres, as shaded in the diagram?

(A) Area $= 2 \times \pi \times \left(\dfrac{30}{2}\right) - 21 \times 13$

(B) Area $= 2 \times \pi \times 30 - 21 \times 13$

(C) Area $= \pi \times \left(\dfrac{30}{2}\right)^2 - 21 \times 13$

(D) Area $= \pi \times 30^2 - 21 \times 13$

$A = \pi R^2 - LB$

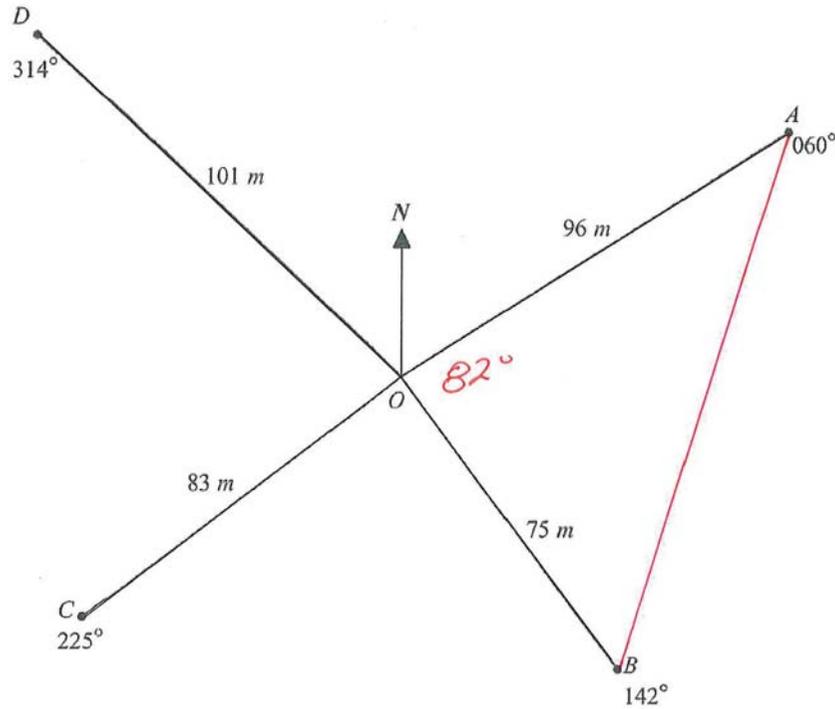$= \pi \times \left(\dfrac{30}{2}\right)^2 - 21 \times 13$

23. Jack manufactures leather wallets. The following graph models the cost and income for his business.

Which of the following is not correct?

(A) Jack's set-up costs are $2000. ✓

(B) Once he has set up his business, each wallet costs $30 to manufacture. ✓

(C) He sells each wallet for $60. ✓

(D) Jack will make a profit if he manufactures 60 wallets

24. This diagram shows a radial survey of a park.

D
314°

101 m

N

A
060°

96 m

82°

O

83 m

75 m

C
225°

B
142°

Which of the following is closest to the area of the triangular region *AOB*?

$A = \frac{1}{2} \times 75 \times 96 \times \sin 82°$

$= 3564 \cdot 965...$

(A) 1002 m²

(B) 3565 m²

(C) 4660 m²

(D) 7130 m2

25. An insurance company offers customers the following discounts on the basic annual premium for car insurance.

Type of discount	Discount	
Multi-policy discount (Owner has more than 2 insurance policies with the company)	15%	✓
No-claim bonus (Owner has had at least 5 years without an insurance claim)	20%	✓
Combined CTP and comprehensive insurance (Owner has both insurances with the company)	$50	✓

If a customer is eligible for more than one discount, subsequent discounts are applied to the already discounted premium. The combined compulsory third party (CTP) and comprehensive insurance discount is always applied.

Lachlan has three insurances policies, including CTO and comprehensive insurance, with the company. He has used this company for 8 years and he has never made a claim.

The basic annual premium for his car insurance is $870.

How much will Lachlan need to pay after the discounts are applied?

(A) $482.44

(B) $515.50

(C) $541.60

(D) $557.60

$870 \times 85\% \times 80\% - \$50$

$= \$541.60$

End of Section I

- 15 -

Section II

75 marks
Attempt Questions 26 – 30
Allow about 1 hour and 55 minutes for this section

Answer all questions in the spaces provided.

Your responses should include relevant mathematical reasoning and/or calculations.

Extra writing space is provided on page 36. If you use this space, clearly indicate which question you are answering.

QUESTION 26 (15 marks)

(a) How long does it take to upload a 15.6 MB file with a transfer rate of 180 kbps?
Answer correct to the nearest minute. **2**

$$time = \frac{15.6 \times 1024 \times 1024 \times 8}{180 \times 1000} \checkmark \quad {}^{b}/_{bps}$$

$$= 727.01 \, sec$$

$$= 12.1168 \, min \checkmark$$

$$= 12 \, min$$

(b) Harry buys a motor vehicle that depreciates at a rate of 12.5% per annum. After four years the motor vehicle has a salvage value of $13 000. **2**

How much did Harry pay for the motor vehicle? Answer to the nearest dollar.

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

$$13000 = V_0(1-12.5\%)^4 \checkmark$$

$$V_0 = \frac{13000}{(1-12.5\%)^4}$$

$$= \$22177.43$$

$$= \$22177 \checkmark$$

- 17 -

(c) Liam's recent results in task 1 and task 2 are recorded in the table below.

	Class mean	Class standard deviation	Liam's results
Task 1	58	8	82
Task 2	58	12	82

(i) What is Liam's z-score for task 2? **1**

$$z = \frac{82-58}{12}$$

$$= 2$$

(ii) Explain the z-score in task 2 in terms of the class mean and standard deviation. **1**

The z score of 2 means his result is 2 standard deviations above the mean.

(iii) What mark for task 1 would be equivalent to a z-score of -2? **1**

$$-2 = \frac{x-58}{8}$$

$$-16 = x-58$$

$$x = 42$$

- 18 -

Question 26 continued

(d)   The table below shows the present value of a $1 annuity.

Period	1%	2%	4%	6%	8%	10%
1	0.9901	0.9804	0.9615	0.9434	0.9259	0.9091
2	1.9704	1.9416	1.8861	1.8334	1.7833	1.7355
3	2.9410	2.8839	2.7751	2.6730	2.5771	2.4869
4	3.9020	3.8077	3.6299	3.4651	3.3121	3.1699
5	4.8534	4.7135	4.4518	4.2124	3.9927	3.7908

(i)   What is the present value of a $60 000 per year annuity at 2% per annum for five years, with interest compounding annually?   1

$$PV = \$60\,000 \times 4.7135$$
$$= \$282\,810$$

(ii)   An annuity of $8000 is invested every three months at 4% per annum, compounded quarterly for one year.

What is the present value of the annuity?   1

1% / quarter
4 quarters

$$PV = \$8000 \times 3.9020$$
$$= \$31\,216$$

(iii)   What is the value of an annuity that would provide a present value of $38 656.50 after three years at 8% per annum compound interest?   1

$$38\,656.50 = Amount \times 2.5771$$
$$Amount = \frac{38\,656.50}{2.5771}$$
$$\therefore annuity = \$15\,000/year$$

Question 26 continues on page 20

- 19 -

Question 26 continued

(e)   William borrowed $236 000 at an interest rate of 5.4% per annum, compounded monthly. The repayments have been set at $1200 per month.

Months (n)	Principal (P)	Interest (I)	Repayment (R)	Balance (P+I−R)
1	$236 000	$1062	$1200	
2			$1200	

(i)   Explain, using a suitable calculation, why the interest charged for the first month is $1062.   1

$$I = 236\,000 \times \frac{5.4\%}{12}$$
$$= \$1062$$

(ii)   How much is owed at the end of the second month?   2

$$Balance\ 1 = 236\,000 + 1062 - 1200$$
$$= \$235\,862 \quad \checkmark$$

$$Interest_2 = \$235\,862 \times \frac{5.4\%}{12}$$
$$= \$1061.38$$

$$Balance\ 2 = \$235\,862 + \$1061.38 - \$1200$$
$$= \$235\,723.38 \quad \checkmark$$

Question 26 continues on page 21

- 20 -

Question 26 continued

(f) A family currently pays $480 for some groceries.

Assuming a constant annual inflation rate of 2.5%, calculate how much would be paid for the same groceries in 4 years' time. Give answer to the nearest cent.   **2**
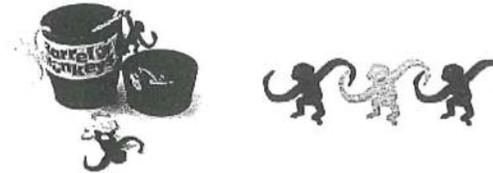
$$Amount = \$480 \times (1 + 2.5\%)^4 \checkmark$$
$$= \$529.83 \quad (nearest\ cent) \checkmark$$

End of Question 26

QUESTION 27   (15 marks)

(a) A barrel of 15 plastic toy monkeys has 7 red, 5 yellow and 3 green.

Three of these monkeys when taken out of the barrel are linked, as shown.

Giving answers as fractions,

(i) What is the probability that the first monkey in the link is red?   **1**

$$\frac{7}{15}$$

(ii) What is the probability that the first two linked monkeys are either both red or both green?   **2**

$$\frac{7}{15} \times \frac{6}{14} + \frac{3}{15} \times \frac{2}{14} \checkmark$$
$$= \frac{1}{5} + \frac{1}{35}$$
$$= \frac{8}{35} \checkmark$$

(iii) If the three monkeys are of different colours, in how many ways can they be linked?   **1**
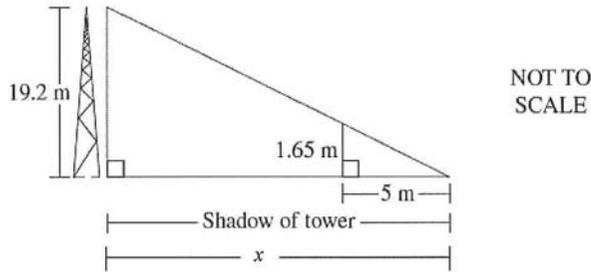
$$3 \times 2 \times 1 = 6$$

(iv) What is the probability that all 3 linked monkeys are of different colours?   **2**

$$6 \times \left(\frac{7}{15} \times \frac{5}{14} \times \frac{3}{13} \right) \checkmark$$
$$= 6 \times \frac{1}{26}$$
$$= \frac{6}{26}$$
$$= \frac{3}{13} \checkmark$$

(b) At a particular time during the day, a tower of height 19.2 metres casts a shadow. At the same time, a person who is 1.65 metres tall casts a shadow 5 metres long.

19.2 m

1.65 m

⊢—5 m—⊣

Shadow of tower

x

NOT TO SCALE

What is the length of the shadow cast by the tower at that time? Give answer correct to one decimal place.

2

$$\frac{x}{5} = \frac{19.2}{1.65}$$ ✓

$$x = \frac{19.2 \times 5}{1.65}$$

$$= 58.1818...$$

$$= 58.2 \text{ metres}$$ ✓

∴ Shadow is 58.2 metres (1dp) ✓

(c) Nicholas has been offered a job by two different sales companies.

Company A	12% commission on total sales.
Company B	$500 per fortnight retainer plus 5% commission on all sales.

Both companies have told Nicholas that his expected sales will be $7250.

Which company will pay Nicholas the greater amount? Support your answer with appropriate mathematical calculations.

2

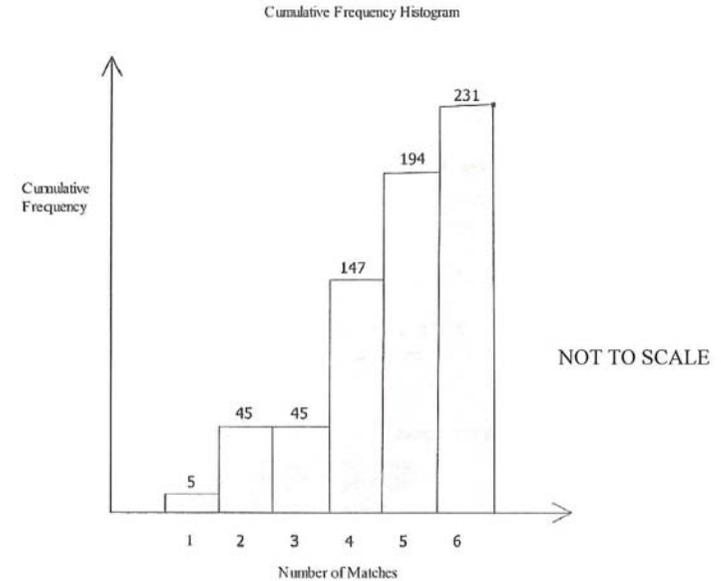Coy A   12% × $7250 = $870 ✓

Coy B $500 + 5% × $7250 = $862.50

∴ Company A pays the greater amount ✓
(by $7.50)

must have a conclusion

(d) The following cumulative frequency histogram represents the runs Steve Smith gained in six matches in a One Day International Series

Cumulative Frequency Histogram

Cumulative Frequency

231

194

147

45   45

5

1   2   3   4   5   6

Number of Matches

NOT TO SCALE

(i) Give a reason why the cumulative frequency for match 3 is the same as the cumulative frequency for match 2.

1

In match 3, Steve didn't score any runs

(ii) How many runs did Steve score in the fourth match?

1

147 − 45 = 102

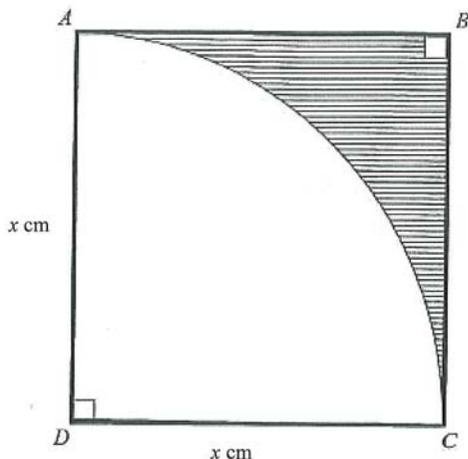(iii) What was Steve Smith's average run score over the International series?

1

Average run rate = $\frac{231}{6}$

= 38.5

Question 27 continued

(e)   A sector ACD with radius x cm and centre D, is cut from a square $ABCD$, as shown in the diagram.   **2**

Show that the area of the shaded section ABC can be given by $\dfrac{x^2(4-\pi)}{4}$ cm^2.

$$A = L^2 - \tfrac{1}{4}\pi R^2$$
$$= x^2 - \frac{\pi x^2}{4} \quad \checkmark$$
$$= \frac{4x^2 - \pi x^2}{4} \quad \checkmark$$
$$= \frac{x^2(4-\pi)}{4}$$

End of Question 27

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Question 28   **(15 Marks)**

(a)   A company's cost ($C) equation for the manufacture of n items is given by:

$$\$C = 2350 + 200n$$

The income (I) received from the sale of these items is given by:

$$\$I = 250n$$

(i)   Show that the equation for the company's profit (P) from the sale of the items can be given by: **2**

$$\$P = 50n - 2350$$
$$P = 250n - (2350 + 200n) \quad \checkmark$$
$$= 250n - 2350 - 200n \quad \checkmark$$
$$= 50n - 2350$$

(ii)   How many items must the company sell in order to break even?   **2**

$$50n = 2350 \quad \checkmark$$
$$n = 47 \quad \checkmark$$
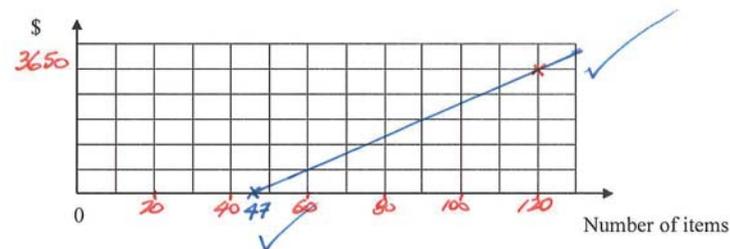$$\therefore \text{Company must sell 47 items}$$

(iii)   Calculate the profit the company makes from the sale of 120 items.   **1**

$$P = 50n - 2350$$
$$= 50 \times 120 - 2350$$
$$\text{Profit} = \$3650$$

(iv)   Using the information in (i), (ii) and (iii), draw the graph of the profit equation in the space below, labelling all relevant details.   **2**

(v)   Explain what the gradient of the graph represents.   **1**

profit per item sold

Question 28 continues on page 27

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(d) Peter and Samantha buy a family car priced at $55 000. In addition to the purchase price, there are the following costs.

- Dealer delivery charges $1995
- Compulsory third-party insurance $748
- Registration $323
- Comprehensive car insurance $920
- Stamp duty, calculated at

    3% of the car value up to and including $45 000

    plus 5% of the car value over $45 000

Calculate the total amount that Peter and Samantha will need to pay.   **2**

$Stamp\ duty = 3\% \times \$45\,000 + 5\% \times \$10\,000$

$= \$1850$

$TOTAL\ COST = \$55\,000 + 1850 + 1995 + 748 + 323 + 920$

$= \$60\,836$

End of Question 28

- 28 -

(b) Solve these equations simultaneously to find the value of x and y.   **3**

$$x - y = 7 \qquad \times 4$$
$$3x + 4y = 14$$
$$4x - 4y = 28 \quad \checkmark$$

$$7x = 42$$
$$x = 6 \quad \checkmark$$
$$6 - y = 7$$
$$-y = 1$$
$$y = -1 \quad \checkmark$$

$$x = 6, \quad y = -1$$

(c) Perth in Western Australia is 8 hours ahead of Greenwich in England. Santiago in Chile is 3 hours behind Greenwich.

What is the day and time in Perth when it is 10pm on Thursday in Santiago?   **2**

$Time\ in\ PERTH = 10pm\ THURS + 8 + 3 \quad \checkmark$

$= 9am\ FRI \quad \checkmark$

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Question 29   **(15 Marks)**

(a)   Solve the equation $\dfrac{5x+2}{3} = 4 - 2x$.   **2**

$$5x + 2 = 3(4 - 2x) \quad \checkmark$$
$$5x + 2 = 12 - 6x$$
$$11x = 10$$
$$x = \frac{10}{11} \quad \checkmark$$

(b)   When a force is applied to a certain object, its acceleration (a) varies inversely as its mass (m). When the acceleration of an object 12 m/s², the corresponding mass is 3 kg.

     (i)   Find the constant of variation   **1**

$$a \propto \frac{1}{m}$$
$$a = \frac{k}{m}$$
$$12 = \frac{k}{3}$$
$$k = 36$$

     (ii)   Find the acceleration of a 1.5 kg object.   **1**

$$a = \frac{36}{m}$$
$$= \frac{36}{1.5}$$
$$= 24 \text{ m/s}^2$$

     (iii)   Find the mass of an object when the acceleration is 6 m/s².   **1**
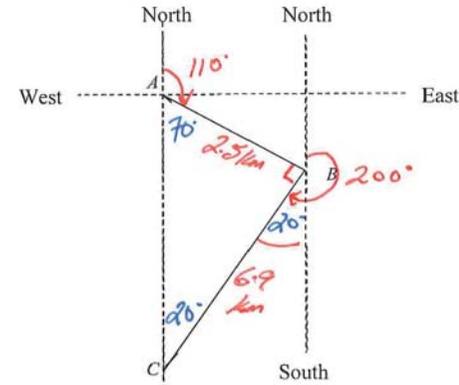
$$a = \frac{36}{m}$$
$$m = \frac{36}{6}$$
$$= 6 \text{ kg}$$

continues of page 30

Question 29 continues of page 30

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Question 29 continued

(c)   Elliot walks 2.5 km from A to B on a bearing of $110°$. He then walks 6.9 km from B to C on a bearing of $200°$.

C is due south of A.

The diagram below shows the positions of A, B and C.

NOT TO SCALE

1 for distances
1 for bearings

     (i)   On the diagram, insert the distances Elliot walked and show the two given bearings.   **2**

     (ii)   What is the size of $\angle BAC$?   **1**

$$\angle BAC = 180 - 110$$
$$= 70°$$

     (iii)   Show that the bearing of B from C is $020°$.   **1**

$$\alpha = 200 - 180°$$
$$\text{Bearing} = 020°$$

$CBS = ACB$ (alt. ∠'s)
$20°$

look at working on diagram

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

Back bearing $= 110 + 180$ OR $200 + 90$
$= 290°$ $= 290$

continues on page 31

Question 29 continues on page 31

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Question 29 continued

   (v)   How far (correct to one decimal place) is C south of A?   **2**
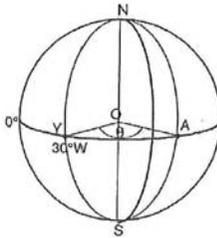
$$AC = \sqrt{2.5^2 + 6.9^2} \quad \checkmark$$

$$= 7.3389$$

$$= 7.3 \text{ km } (1dp) \quad \checkmark$$

2nd Mark for approximation

(d)   Two cities A and Y are located on the equator, as shown in the diagram of the Earth's surface.

   (i)   Write down the co-ordinates of city Y.   **1**

$$(0°, 30°W)$$

   (ii)   The distance between city Y and city A is approximately 5000km.   **2**

Show that θ (angle AOY) is approximately $45°$.

$$L = \frac{\theta}{360} \times 2\pi R$$

$$5000 = \frac{\theta}{360} \times 2\pi \times 6400 \quad \checkmark$$
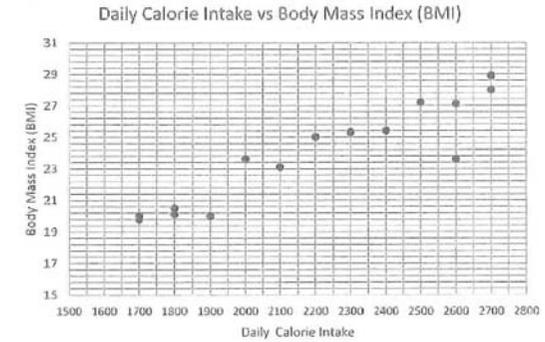
$$\frac{5000 \times 360}{2\pi \times 6400} = \theta \quad \checkmark$$

$$\theta = 44.762....$$

$$\theta = 45° \text{ (nearest degree)}$$

Question 30   **(15 marks)**

(a)

Daily Calorie Intake vs Body Mass Index (BMI)

The scatterplot shows the relationship between the daily Calorie Intake and Body Mass Index (BMI) for a group of 15 adults.

   (i)   The correlation coefficient for the data is 0.93.

Explain what the correlation coefficient indicates about the relationship between daily   **1**
calorie intake and BMI for these adults.

There is a strong positive relationship between BMI & Daily Calorie Intake

   (ii)   The table below shown the mean and standard deviation for calorie intake and
body mass index.

	Mean	Standard Deviation
Daily Calorie Intake (x)	2 200	357·77
Body Mass Index (BMI) (y)	23·84	3·08

Using the above information find the equation of the least-squares line of best fit.   **3**

$$m = r \times \frac{\sigma_y}{\sigma_x} \qquad\qquad b = \bar{y} - (m \times \bar{x})$$

$$= 0.93 \times \frac{3.08}{357.77} \qquad = 23.84 - (0.008 \times 2200)$$

$$= 0.008 \ (3dp) \ \checkmark \qquad = 6.24 \quad \checkmark$$

$$y = 0.008x + 6.24 \quad \checkmark$$

(iii) Explain why the equation of the least-squares line would NOT be reliable for predicting the BMI of a person who consumes 5000 calories daily? **1**

5000 is way outside the values used to determine the 'least-squared' line of best fit

(b) Angus is driving on a motorway at a speed of 90 kilometres an hour and has to brake suddenly. He has a reaction time of 2 seconds and a braking distance of 59.2 metres.
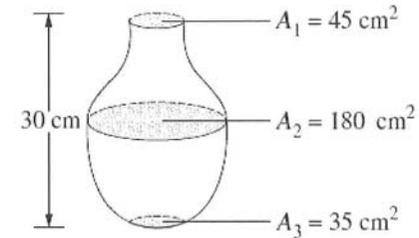
Calculate his stopping distance. **2**

reaction time distance $= 90000 \times \dfrac{2}{60 \times 60}$
$= 50m$ ✓

Stopping distance $= 50 + 59.2$
$= 109.2$ *metres* ✓

(c) Three equally spaced cross-sectional areas of the vase are shown.

$A_1 = 45 \text{ cm}^2$
$A_2 = 180 \text{ cm}^2$
$A_3 = 35 \text{ cm}^2$
30 cm

$h = \dfrac{30}{2}$
$= 15$

Use Simpson's rule to find the approximate capacity of the vase in litres. **3**

$h = \dfrac{30}{2}$
$= 15$ ✓

$V = \dfrac{h}{3}(A_F + 4A_M + A_L)$
$= \dfrac{15}{3}(45 + 180 \times 4 + 35)$
$= 4000 \text{ cm}^3$ ✓
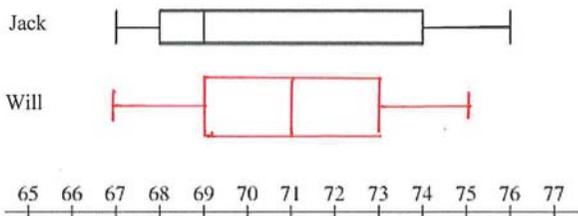
Capacity $= 4000 \text{ mL}$
$= 4 \text{ Litres}$ ✓

Question 30 continued

(d) Jack and Will each sat twenty class tests. Jack's results on the test are displayed in the box-and-whisker plot shown in part (i).

(i) Will's 5 number summary for the tests is 67, 69, 71, 73, 75

Draw a box-and-whisker plot to display to display Will's result below that of Jack's results. **1**

(ii) What percentage of Jack's results were below 69? **1**

50%

(iii) Jack claims that his results were better than Will's. Is he correct? Justify your answer by referring to the summary statistics and skewness of the distributions. **3**

Jack's results are positively skewed while Will's results are symmetrical ✓

Will's median of 71 is higher than Jack's median of 69 ✓

75% of Will's results are over 69 while 50% of Jack's results are over 69. ✓

∴ Jack's claim is incorrect

must have a conclusion

Could use Range & IQR