HORNSBY GIRLS HIGH SCHOOL

Mathematics Standard 2

Year 12 Higher School Certificate Trial
Assessment 4 Term 3 2026

STUDENT NUMBER: _____

General Instructions:

- Reading time – 10 minutes
- Working time – 2 hours and 30 minutes
- Write using black pen
- Calculators approved by NESA may be used
- For questions in Section II, show relevant mathematical reasoning and/or calculations

Total Marks: 100

Section I – 15 marks (pages 3–13)

- Attempt Questions 1–15
- Allow about 25 minutes for this section

Section II – 85 marks (pages 15–39)

- Attempt Questions 16–39
- Allow about 2 hours and 5 minutes for this section

Q1 - 15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27
/15	**/2**	**/2**	**/5**	**/2**	**/2**	**/3**	**/2**	**/2**	**/4**	**/2**	**/2**	**/5**
Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	**Total**
/4	**/4**	**/5**	**/3**	**/4**	**/5**	**/3**	**/5**	**/3**	**/5**	**/6**	**/5**	**/100**

Outcomes assessed:

MS11-1, MS11-2, MS11-3, MS11-4, MS11-5, MS11-6, MS11-7, MS11-8, MS11-10,

MS2-12-1, MS2-12-2, MS2-12-3, MS2-12-4, MS2-12-5, MS2-12-6, MS2-12-7, MS2-12-8, MS2-12-10

This assessment task constitutes 30% of the Higher School Certificate Course School Assessment

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Section I

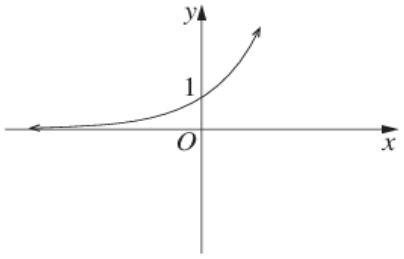
15 marks
Attempt Questions 1–15
Allow about 25 minutes for this section

Use the multiple-choice answer sheet for Questions 1 – 15.

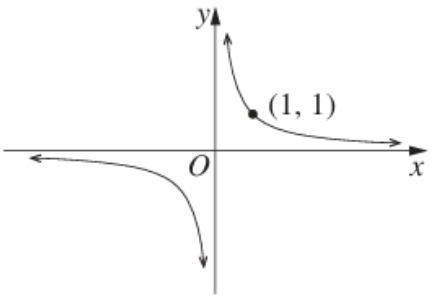
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1 Which of the following could represent the graph of $y = \frac{1}{x}$?

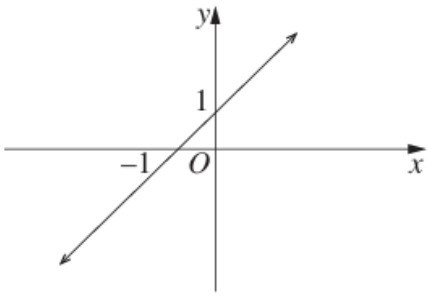
A.



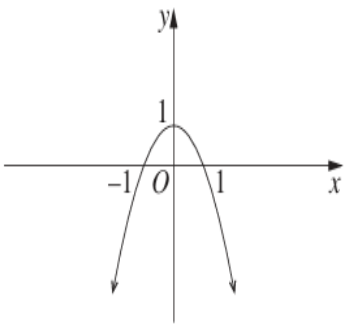
B.



C.



D.



2 The resting heart rates in beats per minute (bmp) of 6 students were recorded in the table below.

Heart rate	55	72	72	76	78	79

The resting rate of 55 bpm was incorrectly recorded and hence removed from the data, which of the following measures will NOT change?

A. Mean

B. Mode

C. Median

D. Range

3 What is 0.006082 expressed in standard form with three significant figures?

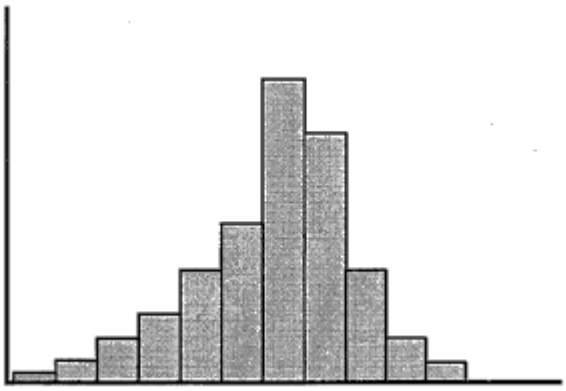
A. 6.08×10^{-2}

B. 6.082×10^{-2}

C. 6.08×10^{-3}

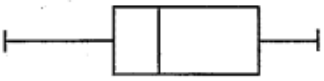
D. 6.082×10^{-3}

4 A distribution is shown below.

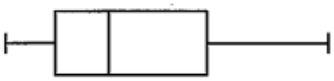


Which of the following box-and-whisker-plots best represents the data distribution?

A.



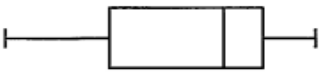
B.



C.



D.



5 The value of P varies directly with Q. It is known that when $P = 4.5$, $Q = 13.5$. What is the value of P when $Q = 42$?

A. 3

B. 14

C. 60.75

D. 126

6 The scale of a map is $1 : 25\,000$. A road is 6 cm long on the map.

What is the actual length of the road?

A. 150 m

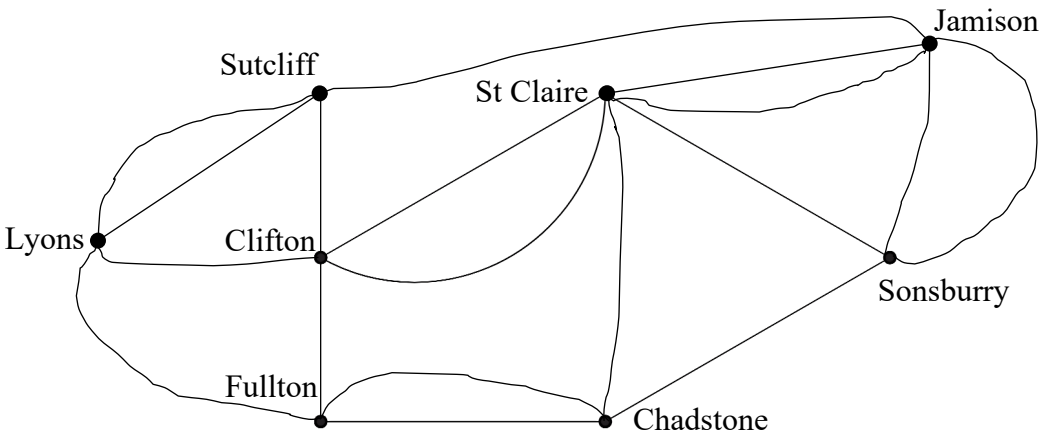
B. 1.5 km

C. 15 km

D. 150 km

7 The edges on the diagram below represent roads that link eight towns.
It is possible for a garbage truck to drive along each road only once and thus not waste fuel.

The garbage truck starts at Jamison and will travel along each road once.
At which town will the garbage truck finish?



A. Jamison

B. St Claire

C. Clifton

D. Lyons

8 Suzan is paid at a rate of $42.50 per hour for working casually from 2:00 pm until 6:00 pm each day, Monday to Friday. When working on a Sunday, Suzan is paid at time-and-a-half rate per hour.

Durning one week, Suzan worked Monday to Friday and Sunday. She was paid a total of $1 168.75 for that week's work.

How many hours did Suzan work on Sunday of this week?

A. 4

B. 5

C. 6

D. 6.5

9 Matt is in hospital and needs to receive 2.5 litres of antibiotic fluid over 5 hours. What is the required flow rate in mL/h?

A. 0.5 mL/h

B. 42 mL/h

C. 500 mL/h

D. 2 500 mL/h

10 Camine has a credit card which has no interest-free period.
Interest is charged at 19.5% per annum, compounding daily, on the amount owing.

At the start of the month Carmine had an opening balance of $162, and during the month Carmine used his credit card to purchase a phone for $700.

He was charged interest on the opening balance for 30 days and on the purchase of the phone for 24 days.

How much interest was Carmine charged for the month?

A. $11.65

B. $24.87

C. $873.65

D. $887.22

11 A rugby fan in Perth (Australia) plans to watch a live match played in New Zealand next winter.
The time zone for Perth is UTC +8. The time zone for New Zealand is UTC +13 in winter and UTC +12 in summer.

If the match is played at 6:30 pm New Zealand time, what time will the match be viewed in Perth?

A. 1:30 pm

B. 2:30 pm

C. 10:30 pm

D. 11:30 pm

12 The stem-and-leaf diagram below shows the distribution of the ages of 24 members of a committee.

Stem	Leaf
2	m
3	2 2 3 7 8 8
4	3 3 4 5 5 6 7 9
5	1 1 n 6
6	0 5 8
7	0 1

If the range and the inter-quartile range of the distribution are 42 and 18 respectively, what are the values of m and n?

A. $m = 8$ and $n = 5$

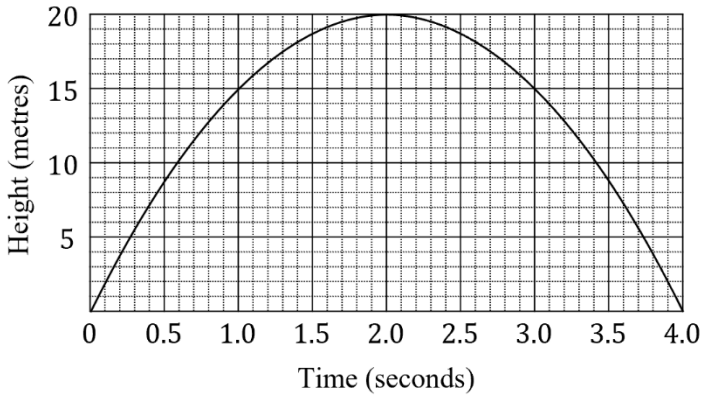
B. $m = 8$ and $n = 6$

C. $m = 9$ and $n = 5$

D. $m = 9$ and $n = 6$

13 A ball is shot vertically into the air from the ground.

The height of the ball above the ground, h metres, can be modelled using the function $h = 20t - 5t^2$, where t is measured in seconds.
The graph of the height of the ball during its flight time is shown below.



Not to scale

For how many seconds is the height of the ball at least half its maximum height?

A. 1.2

B. 2.0

C. 2.8

D. 4.0

14 Box *A* contains 3 red balls and 2 white balls while box *B* contains 6 red balls and 1 white ball.

John draws a ball randomly from box *A* and then puts it into box *B*. If John draws a ball randomly from box *B* afterwards, what is the probability that John draws a red ball?

A. $\frac{9}{20}$

B. $\frac{21}{40}$

C. $\frac{33}{40}$

D. $\frac{9}{10}$

15 A table of future value interest factors for an annuity of $1 is shown.

Future Value Interest Factors of $1					
n	Interest Rate				
	2%	3%	4%	5%	6%
2	2.020	2.030	2.040	2.050	2.060
4	4.122	4.184	4.247	4.310	4.375
6	6.308	6.468	6.633	6.802	6.975
8	8.583	8.892	9.214	9.549	9.898
10	10.950	11.464	12.006	12.578	13.181

An annuity account is opened and equal contributions are made at the end of each 6-month period for 4 years.

For the first 4 years, the interest rate is 6% per annum, compounding half yearly. After the 4 years the investor no longer makes contributions.

For the 5th year, the interest rate increases to 7% per annum, compounding annually. The amount in the account at the end of the 5th year is $14 271.66.

What contribution is made during the first 4 years?

A. $1 500

B. $1 605

C. $3 000

D. $3 045

End of Section I

Section II

85 marks
Attempt Questions 16–39
Allow about 2 hours and 5 minutes for this section

Write answers in the spaces provided.

Question 16 (2 marks)

Claire's laptop consumes 0.15 kilowatts of electricity per hour when charging.
On average, she charges the laptop for 3 hours each day at a rate of 23.17 cents per kilowatt hour.

What will be the cost to charge her laptop for the month of September? **2**

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Question 17 (2 mark)

A person stands on level ground, 45 m away from the base of a 22 m high flagpole.

Find the angle of elevation of the top of the pole, correct to the nearest degree. **2**

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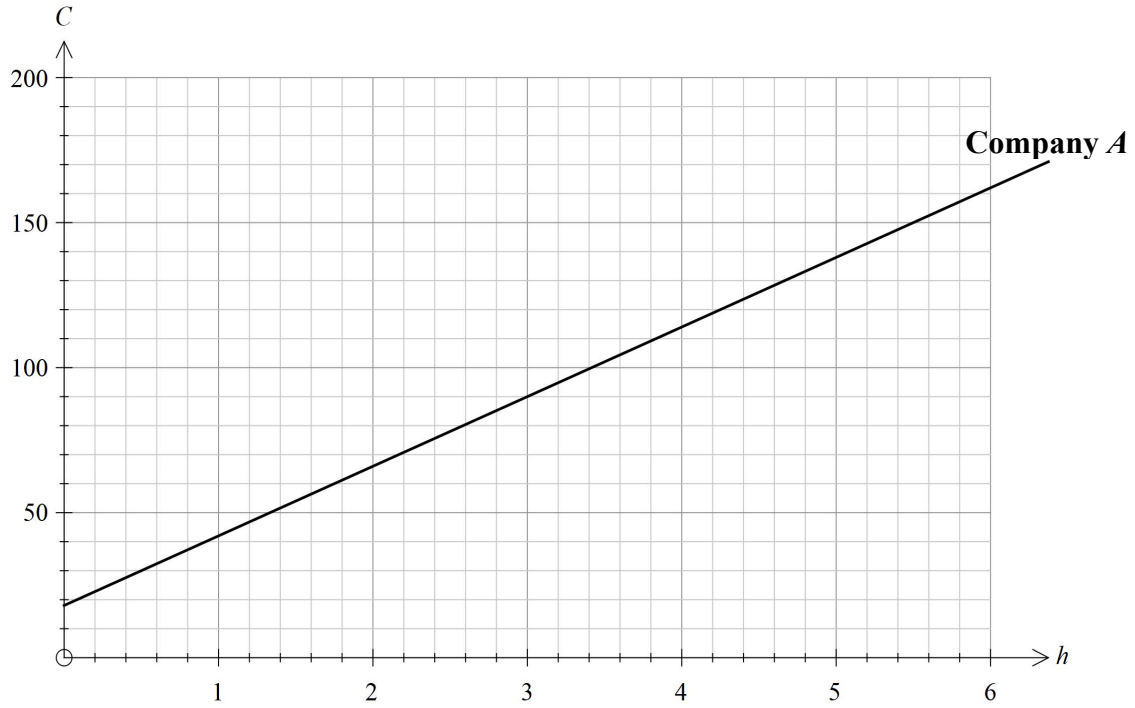
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Question 18 (5 marks)

A company hires electric bicycles to tourists. Company *A* charges according to $C = 24h + 18$, where *C* is the total cost (dollars) and *h* is the number of hours hired.

Company *B* passes through the points $(0,42)$ and $(6,150)$.



a) Determine the equation representing Company *B*. **1**

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b) On the Cartesian Plane above graph the equation representing Company *B*. **1**

c) Using the graph, or otherwise, determine the number of hours for which the two companies charge the same amount. **1**

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d) A family plans to hire bicycles for 7 hours. Which company should they choose? Justify your answer using calculations. **2**

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Question 19 (2 marks)

A sports nutrition company mixes three ingredients, electrolytes : water : flavouring in the ratio $5:3:2$.
A production batch contains 450 L of water.
The finished drink is bottled into 600 mL bottles.
Determine the maximum number of full bottles that can be filled. **2**

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Question 20 (2 mark)

Meri hopes to have $36 000 in 5 years' time to buy a car. She opened a savings account today which pays interest of 4% p.a. compounded half yearly.
Calculate the minimum single sum of money that Meri needs to invest today to ensure she reaches her savings goal. **2**

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Question 21 (3 mark)

Sivani attended a cocktail party. After drinking for 3 hours (H), she consumed 4 standard alcoholic drinks (N). When she stopped drinking, Sivani calculated that she needed to wait 4.5 hours (T) before she would reach zero blood alcohol concentration (BAC).

Sivani used the following formulas for her calculations.

$$BAC = \frac{10N - 7.5H}{5.5M} \text{ and } T = \frac{BAC}{0.015}$$

What was Sivani's mass to the nearest kilogram? **3**

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Question 22 (2 marks)

Tina has 4 600 shares in a company and received a total of $483 in dividends.
At the time the shares were valued at $5.60 each.
What was her dividend yield? **2**

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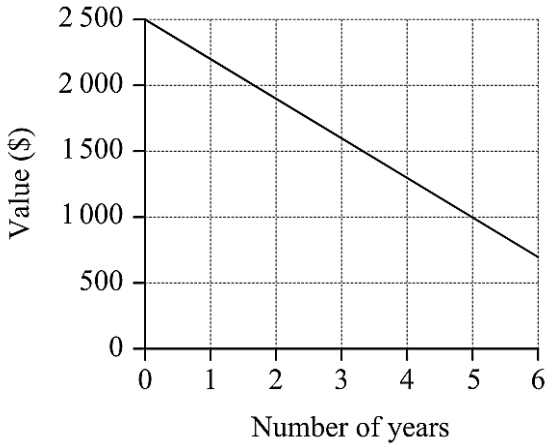
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Question 23 (2 marks)

A painting was purchased for $2 500 and depreciated in value over six years as shown in the graph below.



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Determine the number of years it will take for the painting to reach a salvage value of $100.

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Question 24 (4 marks)

Jordan's financial information for the 2025-26 financial year is shown below.

Description	**Amount ($)**
Wages	61 200
Overtime payments	1 450
Bank interest earned	520
Work- related deductions	4 250
Charitable donations	380
PAYG tax paid	9 130

Taxable income	**Tax payable**
$0 - $18 200	Nil
$18 201 - $45 000	16c for each $1 over $18 200
$45 001 - $135 000	$4 288 plus 30c for each $1 over $45 000
$135 001 - $190 000	$31 288 plus 37c for each $1 over $135 000
Over $190 000	$51 638 plus 45c for each $1 over $190 000

a) Show that Jordan's taxable income is $58 540. **1**

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b) In addition, Jordan knows that he needs to pay an additional 2% of his taxable income as Medicare Levy Tax.
Determine if Jordan receives a tax refund or must pay additional tax.
How much is his refund or liability? Justify your answer with calculations. **3**

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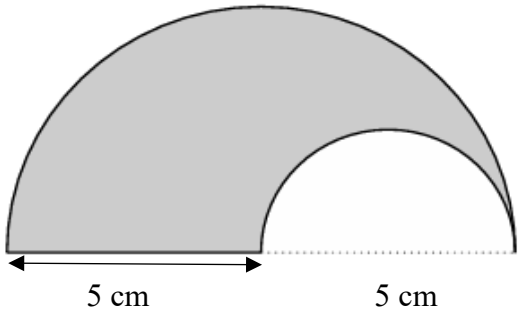
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Question 25 (2 marks)

The diagram is a semi-circle, radius 5 cm with another, smaller semi-circle cut out.



Find the perimeter of the shaded diagram, correct to one decimal place. **2**

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Question 26 (2 marks)

The distances covered by 240 male athletes in two fitness tests are normally distributed.

The mean and standard deviation for each fitness test is displayed in the table below.

	Test 1	**Test 2**
$\overline{x}$	1 680 m	1 760 m
σ	150 m	125 m

The coaching staff classify performance more than two standard deviations above the mean as outstanding.

James covered a distance of 2 000 m in both test 1 and test 2.
He claims that he performed outstandingly in both tests.
Is James correct? Justify your answer using appropriate calculations. **2**

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Question 27 (5 marks)

Janie buys a used car for $8 640.

To transfer the registration to her name it will cost a transfer fee of $32 plus $3 per $100 or part thereof on the sale price of the car.

a) How much will it cost for Janie to transfer the car to her name? **1**

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b) She needs to pay $547.00 for insurance, and she also wants to have personalised number plates which cost $220 to order, plus an annual fee of $102, all payable at the time of ordering.

If she has $10 000 in her bank account, will she have enough to cover the total cost of the car including the transfer of registration? How much short or over is Janie?
Justify your answer with calculations. **2**

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c) After 4 years Janie decides to sell the car. Using the declining-balance method of depreciation based on the purchase price of $8 640, how much can she expect to receive if the value of the car depreciates by 15% per year? **2**

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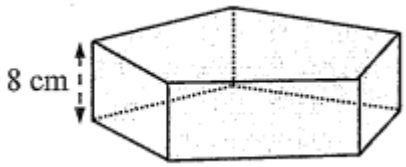
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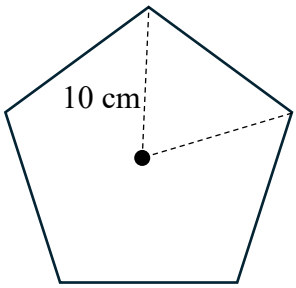
Question 28 (4 marks)

A gift box of height 8 cm is shown below.



Diagrams
Not to Scale

The cross-section of the box is a regular polygon, with each vertex 10 cm from the cross-section centre.



What is the volume of the box, in cubic millimetres, correct to two decimal places? **4**

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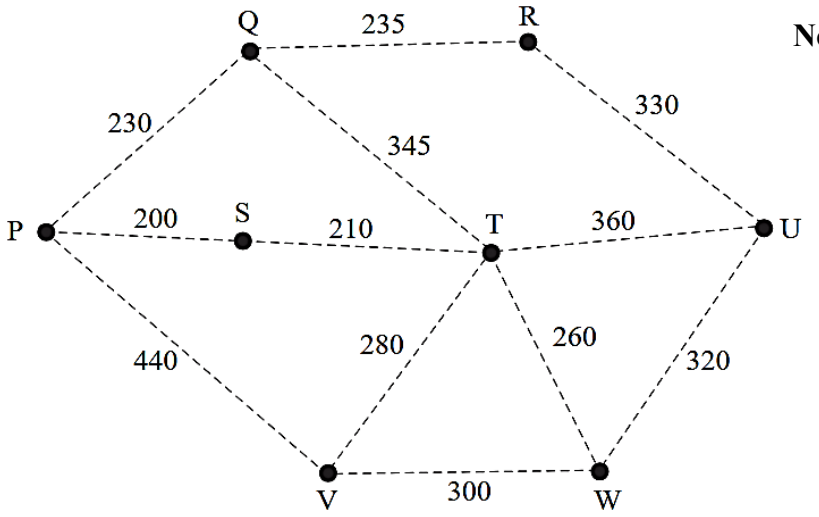
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Question 29 (4 marks)

A pipeline network transports natural gas between eight towns.
The length, km of each pipeline is shown below.



a) On the diagram above, draw the minimum spanning tree for the pipeline network. **2**

b) Referring to your answer in part a), determine whether 2 000 kilometres of pipeline is sufficient to connect the eight towns. Justify your answer. **2**

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Question 30 (5 marks)

A café owner at Manly recorded the average daily temperature, $T\,(^{\circ}C)$, and the number of iced coffees, N, sold on 10 different consecutive days over the summer season.
The table below shows the results.

Day	1	2	3	4	5	6	7	8	9	10
Temperature (T)	21	23	24	27	29	28	30	32	26	29
Number of Iced Coffees (N)	42	51	49	58	74	60	75	74	55	80

a) Calculate Pearsons' Correlation Coefficient, correct to three decimal places. **1**

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b) Identify the strength of the linear association between temperature and the number of iced coffees sold. **1**

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c) Find the equation of the least-squares regression line in terms of temperature (T) and Number of iced coffees sold (N). Express each value correct to two decimal places. **1**

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d) On the 11^{th} day the average daily temperature was $31^{\circ}C$.

Estimate the number of iced coffees sold on this day using the least-squares regression line equation. **1**

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e) Would it be appropriate to use the line of best fit to estimate the number of coffees sold on a day when the average temperature is $9^{\circ}C$? Give a reason for your answer. **1**

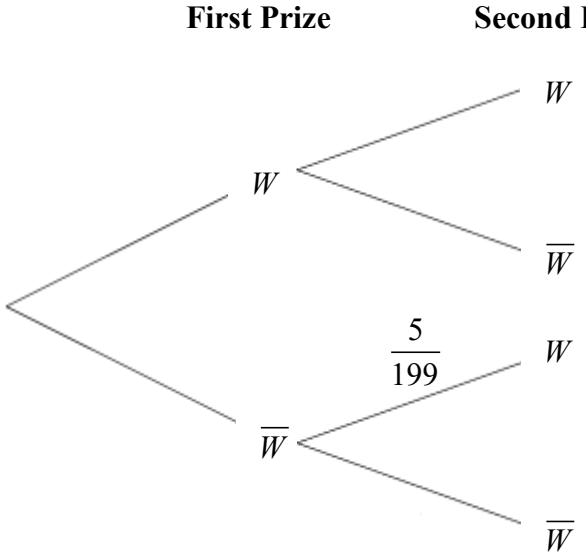
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Question 31 (3 marks)

Two hundred tickets are sold in a raffle in which there are two prizes.
Amanda purchased five tickets in the raffle. The first ticket drawn wins the first prize, while the second ticket drawn wins the second prize.



Complete the tree diagram by including the missing probabilities.
Calculate the probability that Amanda wins at least one of the prizes. **3**

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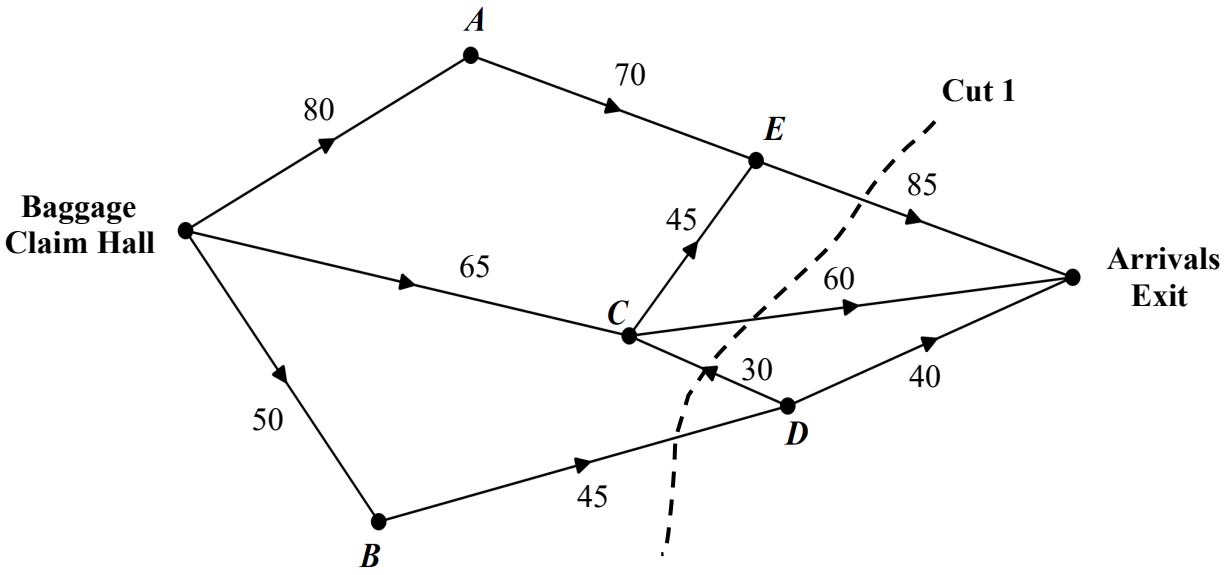
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Question 32 (4 marks)

The network diagram below shows the baggage collection system at an airport. Suitcases arrive at the Baggage Claim Hall and must reach the Arrivals Exit.

The points *A, B, C, D* and *E* are sorting, and transfer areas and 10 conveyor belts operate between the points. The numbers on the conveyor belts represent the maximum number of suitcases per minute that can be transported along each conveyor belt.

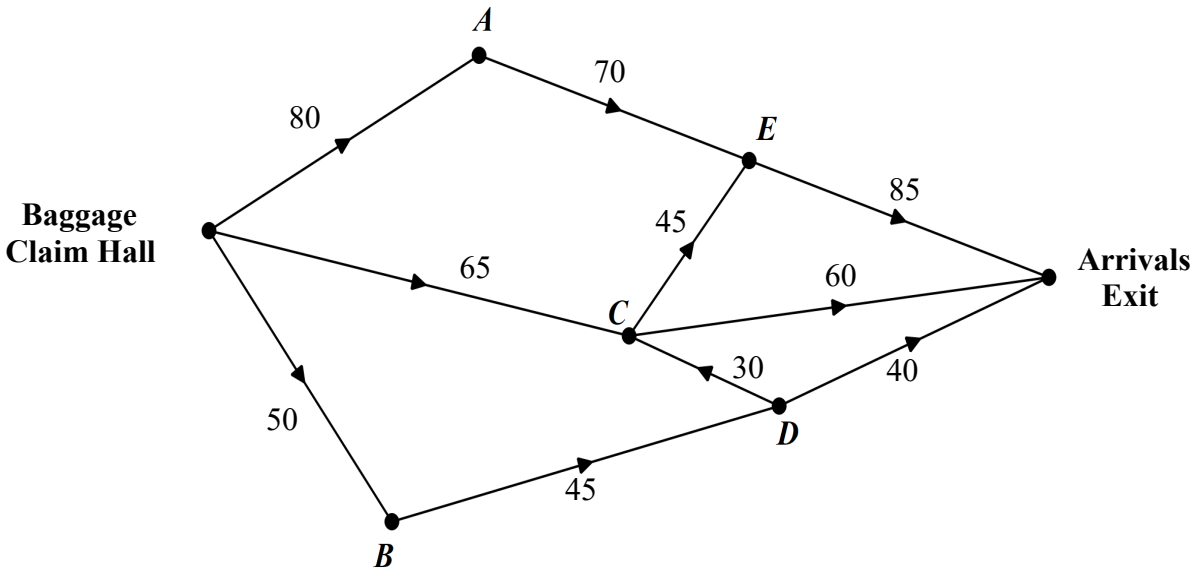


a) What is the capacity of Cut 1 shown on the network diagram above? **1**

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b) Draw the minimum cut on the network diagram below. **1**



c) What is the maximum number of suitcases that can pass through the airport per minute? **1**

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d) The airport would like to increase the maximum number of suitcases that can flow through the airport.
Suggest a change that the airport could make to one of the conveyor belts to allow for an increase of 5 suitcases per minute. **1**

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Question 33 continues on page 30

Question 33 (5 marks)

A wildlife sanctuary is breeding an endangered species of turtle.

The population is modelled by the equation:

$$P = 150(1+r)^t$$

where r is the annual rate of population increase and t is the number of years since the beginning of 2020.

a) How many turtles were at the beginning of the program? **1**

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b) By the end of 2025, the population of the turtles was 338.

What was the annual percentage rate of increase in the population of turtles from the beginning of 2020 to the end of 2025. Give answer correct to one decimal place? **2**

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c) To prevent overcrowding, the sanctuary plans to release 120 turtles into the wild at the beginning of 2028. Determine, how many turtles will remain in the sanctuary immediately after the release. **2**

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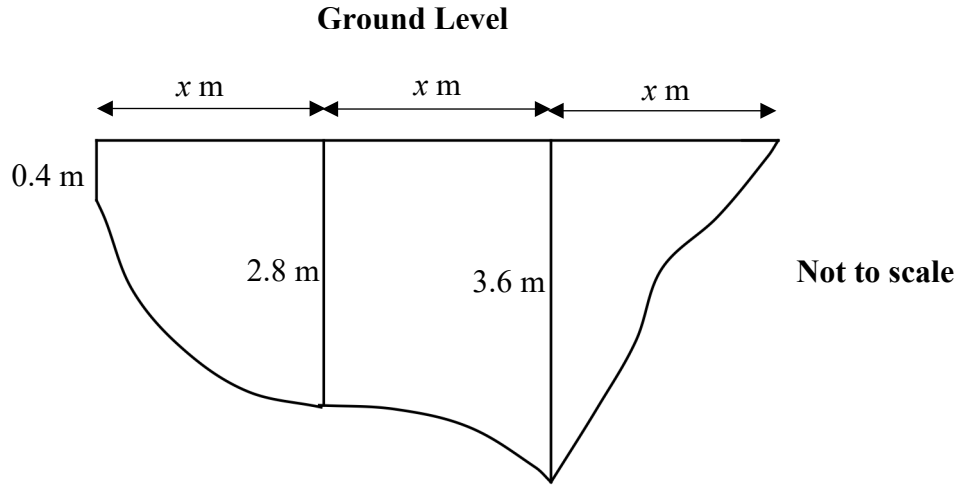
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Question 34 (3 marks)

A surveyor measured the cross-section of a stormwater drainage channel.
The estimated cross-sectional area is 23.1 square metres using three applications of the trapezoidal rule.



Determine the distance x m between each survey point. Show all working. **3**

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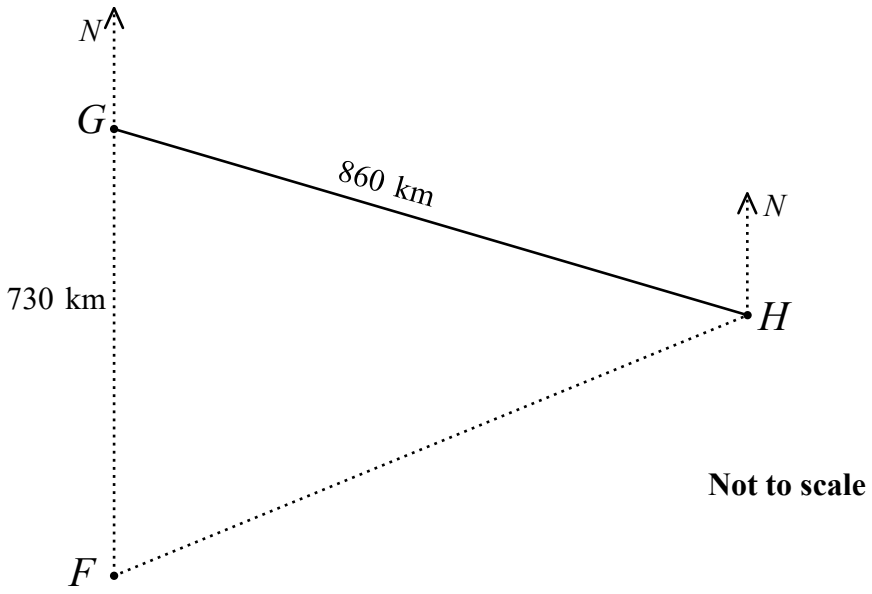
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Question 35 continues on page 32

Question 35 (5 marks)

The diagram below shows the location of three cities and the airline routes connecting them.



City H is 860 km from city G on a bearing of 110°.

City F is 730 km due south of city G.

Find the distance, correct to the nearest km, and the bearing, correct to the nearest degree, of City F from City H. **5**

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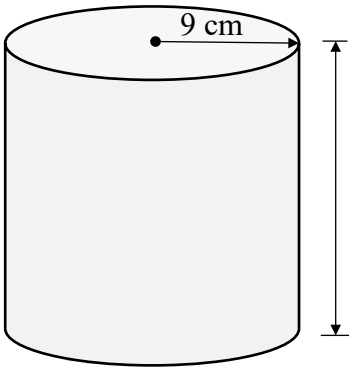
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Question 36 (3 marks)

A chocolatier melts a solid cylindrical block of chocolate with radius 9 cm and height 33 cm.
The melted chocolate is moulded into **1 160** identical solid chocolate spheres.
All the chocolate is used in the manufacturing process.



Not to scale

Calculate the radius of each chocolate sphere, correct to one decimal place. **3**

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Question 37 (5 marks)

A small business borrows $65 000 to purchase new airport baggage handling equipment. The loan is taken out over a period of 5 years at a reducible rate of 6% p.a. charged monthly.

Repayments, R, are made monthly.

Using the table of present value interest factors below and the recurrence relation,

$$A_{n+1} = A_n(1+r) - R$$

Calculate how much interest has been charged on the loan after the second repayment. **5**

Table of present value interest factors for an annuity of $1

Present Value Interest Factors					
Period	*Interest Rate Per period*				
	0.5%	1%	2%	4%	6%
12	12.8548	11.2552	10.5751	9.3851	8.3842
25	23.8654	22.0232	19.5235	15.6221	12.7834
36	32.8710	30.1075	25.4888	18.9803	14.6210
48	42.5803	37.9740	30.6731	21.1951	15.6500
60	51.7256	44.9550	34.7609	22.6235	16.1614
120	90.0735	69.7005	45.3554	24.7741	16.6514
240	139.5808	90.8194	49.5686	24.9980	16.6667

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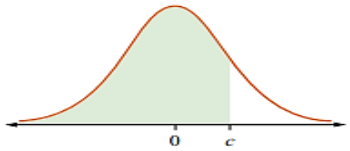
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Question 38 continues on page 36

Question 38 (6 marks)

The standard normal distribution table below represents the area under the normal curve to the left of the z-score.



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.50000	.50399	.50798	.51197	.51595	.51994	.52392	.52790	.53188	.53586
0.1	.53983	.54380	.54776	.55172	.55567	.55966	.56360	.56749	.57142	.57535
0.2	.57926	.58317	.58706	.59095	.59483	.59871	.60257	.60642	.61026	.61409
0.3	.61791	.62172	.62552	.62930	.63307	.63683	.64058	.64431	.64803	.65173
0.4	.65542	.65910	.66276	.66640	.67003	.67364	.67724	.68082	.68439	.68793
0.5	.69146	.69497	.69847	.70194	.70540	.70884	.71226	.71566	.71904	.72240
0.6	.72575	.72907	.73237	.73565	.73891	.74215	.74537	.74857	.75175	.75490
0.7	.75804	.76115	.76424	.76730	.77035	.77337	.77637	.77935	.78230	.78524
0.8	.78814	.79103	.79389	.79673	.79955	.80234	.80511	.80785	.81057	.81327
0.9	.81594	.81859	.82121	.82381	.82639	.82894	.83147	.83398	.83646	.83891
1.0	.84134	.84375	.84614	.84849	.85083	.85314	.85543	.85769	.85993	.86214
1.1	.86433	.86650	.86864	.87076	.87286	.87493	.87698	.87900	.88100	.88298
1.2	.88493	.88686	.88877	.89065	.89251	.89435	.89617	.89796	.89973	.90147
1.3	.90320	.90490	.90658	.90824	.90988	.91149	.91308	.91466	.91621	.91774
1.4	.91924	.92073	.92220	.92364	.92507	.92647	.92785	.92922	.93056	.93189
1.5	.93319	.93448	.93574	.93699	.93822	.93943	.94062	.94179	.94295	.94408

The weight of checked baggage at an international airport is normally distributed.
The mean baggage weight is 20 kg and standard deviation σ kg is unknown.

The classification of bags at the airport is as follows:

Weight of bag W kg	$W < 14$	$14 \leq W \leq 32$	$W > 32$
Classification	small	medium	large

The airport manager knows that 15.866% of bags weigh more than 28 kg.

a) Calculate the value of σ. **2**

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b) The airport expects 18 600 passengers to check in baggage during a holiday period.

Estimate the number of passengers who will have a bag that is classified as medium weight. Give your answer to the nearest whole passenger. **4**

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Question 39 (5 marks)

The table below lists activities for the construction of a community sports pavilion. Some durations are unknown (*marked* ?)

Activity	Prerequisites	Duration (days)
A	-	?
B	-	6
C	A	?
D	B	9
E	A, D	7
F	C, E	?
G	D	?
H	F, G	4

The minimum completion time for the project is 32 days.

The critical path includes **B, D, E, F** and **H** only.

The float time for activity **G** is 5 days, and the float time for activity **C** is 4 days.

a) Find the durations (in days) for activities **F** and **G.** Include a network diagram in your answer. **3**

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b) Find the range of durations possible for activities **A** and **C**, assuming whole number durations. **2**

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End of Assessment Task

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If you use this space, clearly indicate which question you are answering.

Section II extra writing space

If you use this space, clearly indicate which question you are answering.

HORNSBY GIRLS HIGH SCHOOL

Mathematics Standard 2

Year 12 Higher School Certificate Trial
Assessment 4 Term 3 2026

STUDENT NUMBER: SOLUTIONS .

General Instructions:

- Reading time – 10 minutes
- Working time – 2 hours and 30 minutes
- Write using black pen
- Calculators approved by NESA may be used
- For questions in Section II, show relevant mathematical reasoning and/or calculations

Total Marks: 100

Section I – 15 marks (pages 3–13)

- Attempt Questions 1–15
- Allow about 25 minutes for this section

Section II – 85 marks (pages 15–39)

- Attempt Questions 16–39
- Allow about 2 hour and 5 minutes for this section

Q1 - 15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27
/15	/2	/2	/5	/2	/2	/3	/2	/2	/4	/2	/2	/5
Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	**Total**
/4	/4	/5	/3	/4	/5	/3	/5	/3	/5	/6	/5	/100

Outcomes assessed:

MS11-1, MS11-2, MS11-3, MS11-4, MS11-5, MS11-6, MS11-7, MS11-8, MS11-10,

MS2-12-1, MS2-12-2, MS2-12-3, MS2-12-4, MS2-12-5, MS2-12-6, MS2-12-7, MS2-12-8, MS2-12-10

This assessment task constitutes 30% of the Higher School Certificate Course School Assessment

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Section I

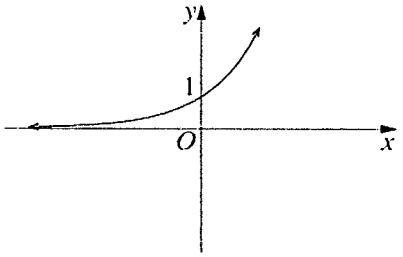
15 marks
Attempt Questions 1–15
Allow about 25 minutes for this section

Use the multiple-choice answer sheet for Questions 1 – 15.

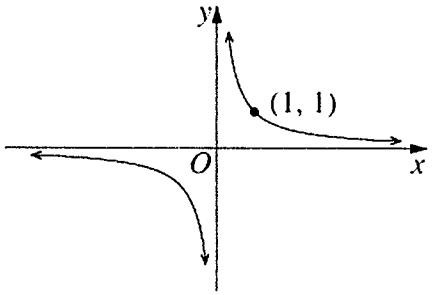
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1 Which of the following could represent the graph of $y = \frac{1}{x}$?

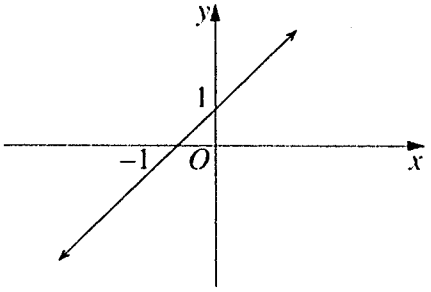
A.



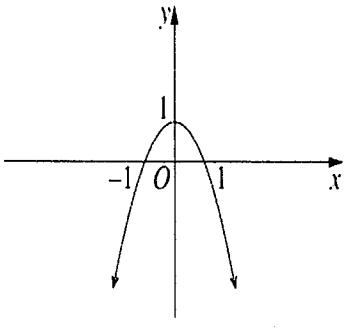
B.



C.



D.



2 The resting heart rates in beats per minute (bmp) of 6 students were recorded in the table below.

Heart rate	55	72	72	76	78	79

The resting rate of 55 bpm was incorrectly recorded and hence removed from the data, which of the following measures will NOT change?

A. Mean

B. Mode

C. Median

D. Range

3 What is 0.006082 expressed in standard form with three significant figures?

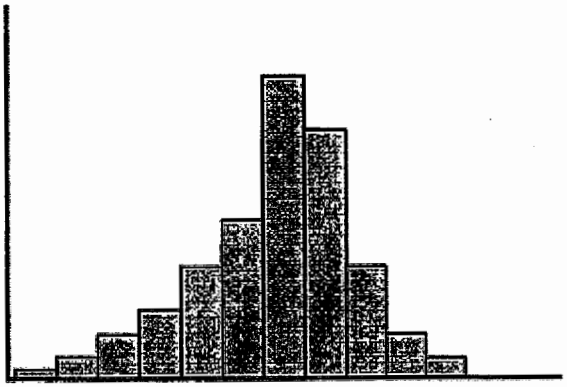
A. 6.08×10^{-2}

B. 6.082×10^{-2}

C. 6.08×10^{-3}

D. 6.082×10^{-3}

4 A distribution is shown below.



Which of the following box-and-whisker-plots best represents the data distribution?

A.



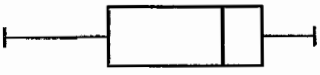
B.



C.



(D.)



5 The value of P varies directly with Q. It is known that when $P = 4.5$, $Q = 13.5$. What is the value of P when $Q = 42$?

A. 3

(B.) 14

C. 60.75

D. 126

$P \propto Q$

$P = kQ$

$4.5 = k13.5$

$k = \frac{4.5}{13.5}$

$= \frac{1}{3}$

$\therefore P = \frac{Q}{3}$

$P = \frac{42}{3}$

$= 14$

6 The scale of a map is 1 : 25 000. A road is 6 cm long on the map.

What is the actual length of the road?

A. 150 m

(B.) 1.5 km

C. 15 km

D. 150 km

$(6 \times 25000)\,cm$

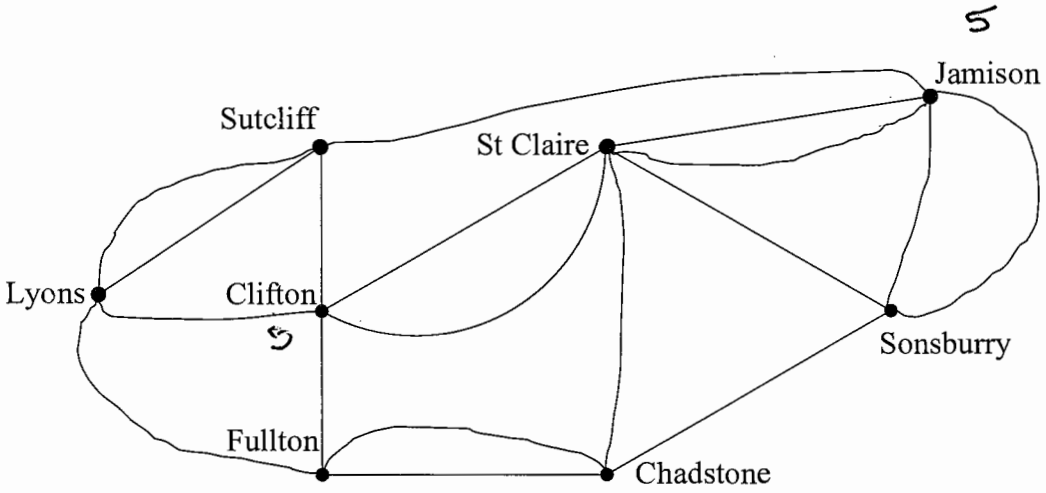
$= 150\,000\,cm \div 100$

$= 1500m \div 1000$

$= 1.5km$

7 The edges on the diagram below represent roads that link eight towns.
It is possible for a garbage truck to drive along each road only once and thus not waste fuel.

The garbage truck starts at Jamison and will travel along each road once.
At which town will the garbage truck finish?



A. Jamison

B. St Claire

(C) Clifton

D. Lyons

8 Suzan is paid at a rate of $42.50 per hour for working casually from 2:00 pm until 6:00 pm each day, Monday to Friday. When working on a Sunday, Suzan is paid at time-and-a-half rate per hour.

Durning one week, Suzan worked Monday to Friday and Sunday. She was paid a total of $1 168.75 for that week's work.

How many hours did Suzan work on Sunday of this week?

A. 4

B. 5

C. 6

D. 6.5

$\$42.50(5\times4+1.5x)=\$1168.75$

$20+1.5x=\$1168.75$

$\$42.50$

$\therefore \$27.50$

$\therefore 1.5x=\$27.50-20$

$=7.5$

$\therefore x=\frac{7.5}{1.5}$

$=5$

9 Matt is in hospital and needs to receive 2.5 litres of antibiotic fluid over 5 hours. What is the required flow rate in mL/h?

A. 0.5 mL/h

B. 42 mL/h

C. 500 mL/h

D. 2 500 mL/h

2500mL | 5hrs

500mL | hr

10 Camine has a credit card which has no interest-free period.
Interest is charged at 19.5% per annum, compounding daily, on the amount owing.

At the start of the month Carmine had an opening balance of $162, and during the month Carmine used his credit card to purchase a phone for $700.

He was charged interest on the opening balance for 30 days and on the purchase of the phone for 24 days.

How much interest was Carmine charged for the month?

(A.) $11.65

B. $24.87

C. $873.65

D. $887.22

$FV = \$162\left(1+\frac{0.195}{365}\right)^{30}$

$= \$164.62$

$\therefore I = FV - PV$

$= \$164.62 - \$162 = \$2.62$

$FV = \$700\left(1+\frac{0.195}{365}\right)^{24}$

$= \$709.03$

$\therefore I = \$709.03 - \$700 = \$9.03$

Total Interest $= \$2.62 + \$9.03$

$= \$11.65$

11 A rugby fan in Perth (Australia) plans to watch a live match played in New Zealand next winter.
The time zone for Perth is UTC +8. The time zone for New Zealand is UTC +13 in winter and UTC +12 in summer.

If the match is played at 6:30 pm New Zealand time, what time will the match be viewed in Perth?

(A.) 1:30 pm

B. 2:30 pm

C. 10:30 pm

D. 11:30 pm

12 The stem-and-leaf diagram below shows the distribution of the ages of 24 members of a committee.

Stem	Leaf
2	m
3	2 2 3 7 8 8
4	3 3 4 5 5 6 7 9
5	1 1 n 6
6	0 5 8
7	0 1

If the range and the inter-quartile range of the distribution are 42 and 18 respectively, what are the values of m and n?

A. $m = 8$ and $n = 5$

B. $m = 8$ and $n = 6$

C. $m = 9$ and $n = 5$

(D) $m = 9$ and $n = 6$

Range: $71 - (20+m) = 42$

$51 - m = 42$

$-m = -9$

$m = 9$

IQR: $Q_3 - Q_1$

$\frac{106+n}{2} - 38 = 18$

$\frac{106+n}{2} = 56$

$106+n = 112$

$n = 112 - 106$

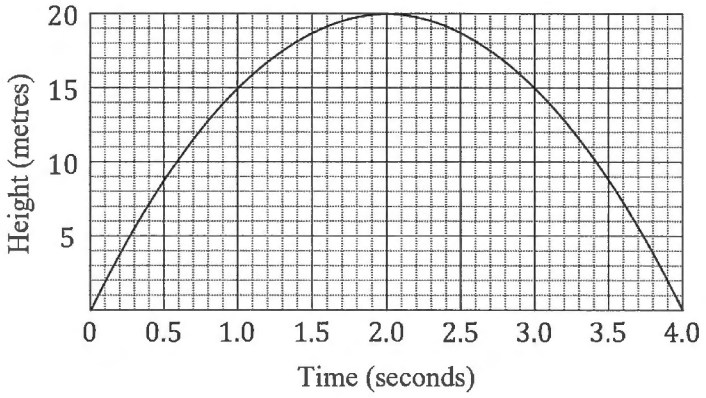
$= 6$

$Q_3 = \frac{50+n+56}{2}$

$= \frac{106+n}{2}$

13 A ball is shot vertically into the air from the ground.

The height of the ball above the ground, h metres, can be modelled using the function $h = 20t - 5t^2$, where t is measured in seconds.
The graph of the height of the ball during its flight time is shown below.



Not to scale

For how many seconds is the height of the ball at least half its maximum height?

A. 1.2

B. 2.0

C. 2.8

D. 4.0

$3.4s - 0.6s = 2.8s$.

14 Box A contains 3 red balls and 2 white balls while box B contains 6 red balls and 1 white ball.
John draws a ball randomly from box A and then puts it into box B. If John draws a ball randomly from box B afterwards, what is the probability that John draws a red ball?

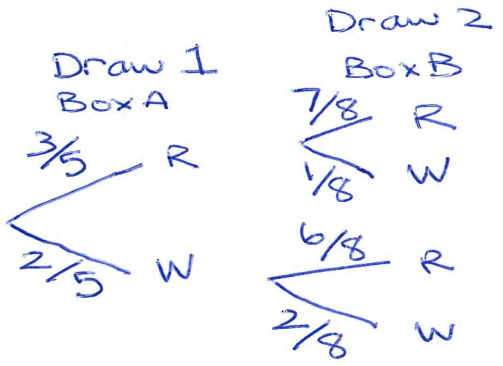
Box B : 6R 1W
+1 = 8

A. $\frac{9}{20}$

B. $\frac{21}{40}$

C. $\frac{33}{40}$

D. $\frac{9}{10}$



$P(2\text{Ball is Red}) = \frac{3}{5} \times \frac{7}{8} + \frac{2}{5} \times \frac{6}{8}$

$= \frac{21}{40} + \frac{12}{40}$

$= \frac{33}{40}$

15 A table of future value interest factors for an annuity of \$1 is shown.

Future Value Interest Factors of \$1					
n	Interest Rate				
	2%	3%	4%	5%	6%
2	2.020	2.030	2.040	2.050	2.060
4	4.122	4.184	4.247	4.310	4.375
6	6.308	6.468	6.633	6.802	6.975
8	8.583	8.892	9.214	9.549	9.898
10	10.950	11.464	12.006	12.578	13.181

An annuity account is opened and equal contributions are made at the end of each 6-month period for 4 years.

For the first 4 years, the interest rate is 6% per annum, compounding half yearly. After the 4 years the investor no longer makes contributions.

For the 5th year, the interest rate increases to 7% per annum, compounding annually. The amount in the account at the end of the 5th year is \$14 271.66.

What contribution is made during the first 4 years?

A. \$1 500

B. \$1 605

C. \$3 000

D. \$3 045

First 4 years:

$R = \frac{6\%}{2} = 3\%$ | 6mths

$n = 4 \times 2 = 8$

FV I F = 8.892

$FV = FV\,I\,F\ a$

$= 8.892\ a$

∴ The Fifth year

$8.892\ a\ (1.07) = 14\ 271.66$

$a = \frac{14271.66}{8.892 \times 1.07}$

$= 1500$

End of Section I

HORNSBY GIRLS HIGH SCHOOL

Mathematics Standard 2

Year 12 Higher School Certificate Trial
Assessment 4 Term 3 2026

STUDENT NUMBER: SOLUTIONS

Section I – Multiple Choice Answer Sheet

Allow about 25 minutes for this section

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 the correct answer by writing the word **correct** and drawing an arrow as follows.

A ✕ B ● (correct) C ○ D ○

1.	A ○	B ●	C ○	D ○	
2.	A ○	B ●	C ○	D ○	
3.	A ○	B ○	C ●	D ○	1
4.	A ○	B ○	C ○	D ●	1
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 ○	

Section II

85 marks
Attempt Questions 16–39
Allow about 2 hours and 5 minutes for this section

Write answers in the spaces provided.

Question 16 (2 marks)

Claire's laptop consumes 0.15 kilowatts of electricity per hour when charging.
On average, she charges the laptop for 3 hours each day at a rate of 23.17 cents per kilowatt hour.

What will be the cost to charge her laptop for the month of September? **2**

# of hours = 30 day × 3hrs = 90hrs

# of kw = 90 × 0.15 kw

= 13.5 kw

Cost = 13.5 × $0.2317

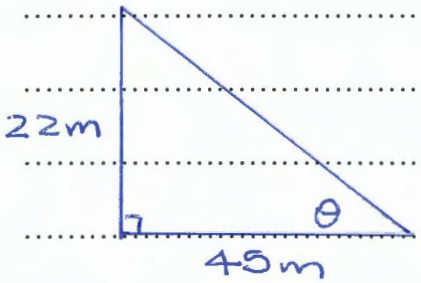
= $3.12795

≑ $3.13

Question 17 (2 mark)

A person stands on level ground, 45 m away from the base of a 22 m high flagpole.

Find the angle of elevation of the top of the pole, correct to the nearest degree. **2**



$\tan\theta = \frac{22}{45}$

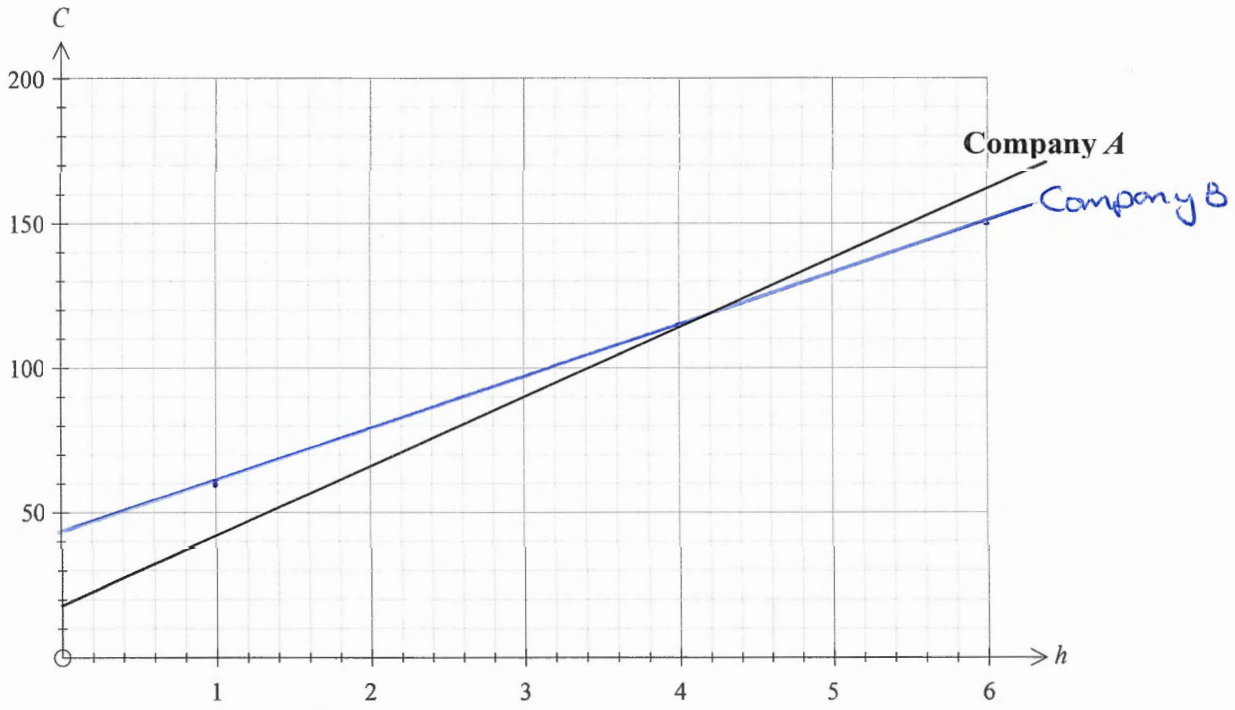
$\therefore \theta = \tan^{-1}\left(\frac{22}{45}\right)$

$= 26.0534...^\circ$

$\doteq 26^\circ$ (nearest degree)

Question 18 (5 marks)

A company hires electric bicycles to tourists. Company A charges according to $C = 24h + 18$, where C is the total cost (dollars) and h is the number of hours hired.
Company B passes through the points $(0,42)$ and $(6,150)$.



a) Determine the equation representing Company B. **1**

$C = 18h + 42$

b) On the Cartesian Plane above graph the equation representing Company B. **1**

c) Using the graph, or otherwise, determine the number of hours for which the two companies charge the same amount. **1**

From the graph: OR $24h + 18 = 18h + 42$

$h = 4$ hrs $6h = 24$

$h = 4$.

d) A family plans to hire bicycles for 7 hours. Which company should they choose? Justify your answer using calculations. **2**

Company B: $C = 18(7) + 42 = \$168$

Company A: $C = 24(7) + 18 = \$186$

∴ Company B is cheaper by \$18.

Question 19 (2 marks)

A sports nutrition company mixes three ingredients, electrolytes : water : flavouring in the ratio 5 : 3 : 2.
A production batch contains 450 L of water.
The finished drink is bottled into 600 mL bottles.
Determine the maximum number of full bottles that can be filled. **2**

3 parts is 450 L

1 part is 150 L

10 parts is 1500 L

1500 L = 1500000 mL

Number of bottles = 1500000 ÷ 600

= 2500 bottles

Question 20 (2 mark)

Meri hopes to have \$36 000 in 5 years' time to buy a car. She opened a savings account today which pays interest of 4% p.a. compounded half yearly.
Calculate the minimum single sum of money that Meri needs to invest today to ensure she reaches her savings goal. **2**

$r = \frac{4\%}{2}$ p.a. = 2% | 6mths

$n = 5 \times 2 = 10$

FV = \$36000

PV =

$FV = PV(1+r)^n$

$36000 = PV(1+0.02)^{10}$

$\therefore PV = \frac{36000}{(1.02)^{10}}$

= \$29532.5388...

= \$29532.54 needs to be invested.

Question 21 (3 mark)

Sivani attended a cocktail party. After drinking for 3 hours (H), she consumed 4 standard alcoholic drinks (N). When she stopped drinking, Sivani calculated that she needed to wait 4.5 hours (T) before she would reach zero blood alcohol concentration (BAC).

Sivani used the following formulas for her calculations.

$$BAC = \frac{10N - 7.5H}{5.5M} \text{ and } T = \frac{BAC}{0.015}$$

What was Sivani's mass to the nearest kilogram? **3**

When $T = 4.5$ $\quad T = \frac{BAC}{0.015}$

$4.5 = \frac{BAC}{0.015}$

$\therefore BAC = 4.5 \times 0.015$

$= 0.0675$

When $BAC = 0.0675$, $H = 3$, $N = 4$, $M = ?$

$BAC = \frac{10N - 7.5H}{5.5M}$

$0.0675 = \frac{10(4) - 7.5(3)}{5.5M}$

$\therefore M = \frac{40 - 22.5}{0.0675 \times 5.5}$

$= \frac{17.5}{0.37125}$

$= 47.138...$

$\doteq 47$ kg (nearest kg).

Question 22 (2 marks)

Tina has 4 600 shares in a company and received a total of $483 in dividends.
At the time the shares were valued at $5.60 each.
What was her dividend yield? **2**

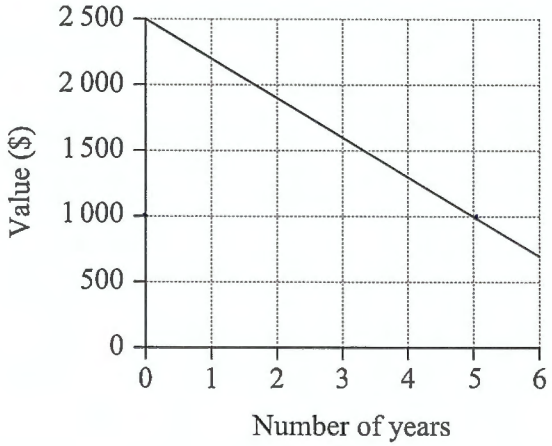
Dividend / share = $\frac{\$483}{4600} = \$0.105$

$\therefore$ Dividend yield = $\frac{0.105}{\$5.60} \times 100\%$

$= 1.875\%$

Question 23 (2 marks)

A painting was purchased for $2 500 and depreciated in value over six years as shown in the graph below.



Determine the number of years it will take for the painting to reach a salvage value of $100. **2**

$V = 2500 - \frac{1500}{5} n$

$= 2500 - 300n$

$\therefore$ It will take 8 years.

$\therefore \quad 100 = 2500 - 300n$

$-300n = -2400$

$n = 8.$

Question 24 (4 marks)

Jordan's financial information for the 2025-26 financial year is shown below.

Description	**Amount ($)**
Wages	61 200
Overtime payments	1 450
Bank interest earned	520
Work- related deductions	4 250
Charitable donations	380
PAYG tax paid	9 130

Taxable income	**Tax payable**
$0 - $18 200	Nil
$18 201 - $45 000	16c for each $1 over $18 200
$45 001 - $135 000	$4 288 plus 30c for each $1 over $45 000
$135 001 - $190 000	$31 288 plus 37c for each $1 over $135 000
Over $190 000	$51 638 plus 45c for each $1 over $190 000

a) Show that Jordan's taxable income is $58 540. **1**

Taxable Income = Gross Income − Deductions

= $61200 + $1450 + $520

−($4 250 + $380)

= $63 170 − $4 630

= $58 540 as required.

b) In addition, Jordan knows that he needs to pay an additional 2% of his taxable income as Medicare Levy Tax.
Determine if Jordan receives a tax refund or must pay additional tax.
How much is his refund or liability? Justify your answer with calculations. **3**

Medicare levy Tax = 2% × $58 540 = $1170·80

Tax payable = $4 288 + 0·3($58 540 − $45 000)

= $4 288 + $4062

= $8350

Total tax payable = $8350 + $1170·80

= $9520·80

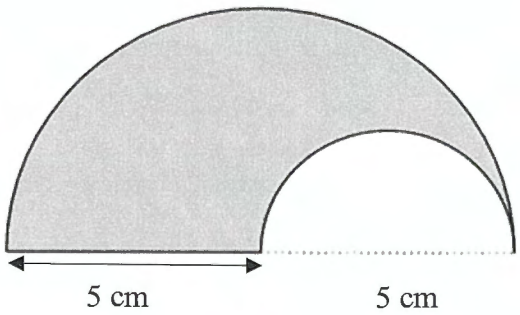
PAYG = $9130

∴ Jordan must pay additional tax

his liability is $9520·80 − $9130 = $390·80

Question 25 (2 marks)

The diagram is a semi-circle, radius 5 cm with another, smaller semi-circle cut out.



Find the perimeter of the shaded diagram, correct to one decimal place. **2**

$P = \frac{1}{2} \times 2 \times \pi \times 5 + \frac{1}{2} \times 2\pi \times 2{\cdot}5 + 5$

$= 5\pi + 2{\cdot}5\pi + 5$

$= 28{\cdot}5619\ldots$

$\doteq 28{\cdot}6$ cm (1dp)

Question 26 (2 marks)

The distances covered by 240 male athletes in two fitness tests are normally distributed.

The mean and standard deviation for each fitness test is displayed in the table below.

	Test 1	**Test 2**
$\bar{x}$	1 680 m	1 760 m
σ	150 m	125 m

The coaching staff classify performance more than two standard deviations above the mean as outstanding.

James covered a distance of 2 000 m in both test 1 and test 2.
He claims that he performed outstandingly in both tests.
Is James correct? Justify your answer using appropriate calculations. 2

Test 1: $Z = \frac{2000 - 1680}{150}$

$= 2.1\dot{3}$ st.dv > 2 st.dev.

Test 2: $Z = \frac{2000 - 1760}{125}$

$= 1.92 < 2$ st.dev.

No, James is not correct he performed outstandingly in test 1 not test 2

Question 27 continues on page 23

Question 27 (5 marks)

Janie buys a used car for $8 640.

To transfer the registration to her name it will cost a transfer fee of $32 plus $3 per $100 or part thereof on the sale price of the car.

a) How much will it cost for Janie to transfer the car to her name? **1**

Cost = $32 + $3 × $\frac{8700}{100}$

= $293.

b) She needs to pay $547.00 for insurance, and she also wants to have personalised number plates which cost $220 to order, plus an annual fee of $102, all payable at the time of ordering.

If she has $10 000 in her bank account, will she have enough to cover the total cost of the car including the transfer of registration? How much short or over is Janie? Justify your answer with calculations. **2**

Total cost = $8640 + $293 + $547 + $220 + $102

= $9802

∴ $10 000 − $9802 = $198.

Janie will have enough to pay for the car

She is $198 over.

c) After 4 years Janie decides to sell the car. Using the declining-balance method of depreciation based on the purchase price of $8 640, how much can she expect to receive if the value of the car depreciates by 15% per year? **2**

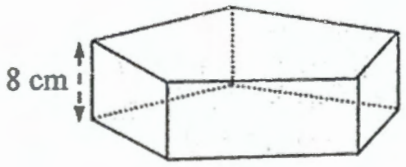
$V = \$8640(1-0.15)^4$

= $4510.134

≈ $4510.13

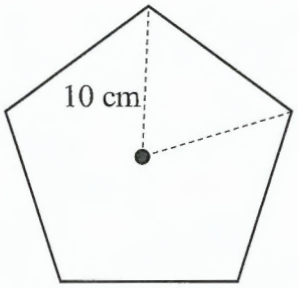
Question 28 (4 marks)

A gift box of height 8 cm is shown below.



Diagrams Not to Scale

The cross-section of the box is a regular polygon, with each vertex 10 cm from its centre.



What is the volume of the box, in cubic mm, correct to two decimal places? **4**

Angle of each triangle = $360° \div 5 = 72°$

Area of polygon = $5 \times \left(\frac{1}{2} \times 10 \times 10 \sin 72°\right)$

$= 5 \times 47.55\ldots$

$= 237.7641\ldots \text{ cm}^2$

$V = \text{base} \times h$

$= 237.7641\ldots \times 8$

$= 1902.113033$

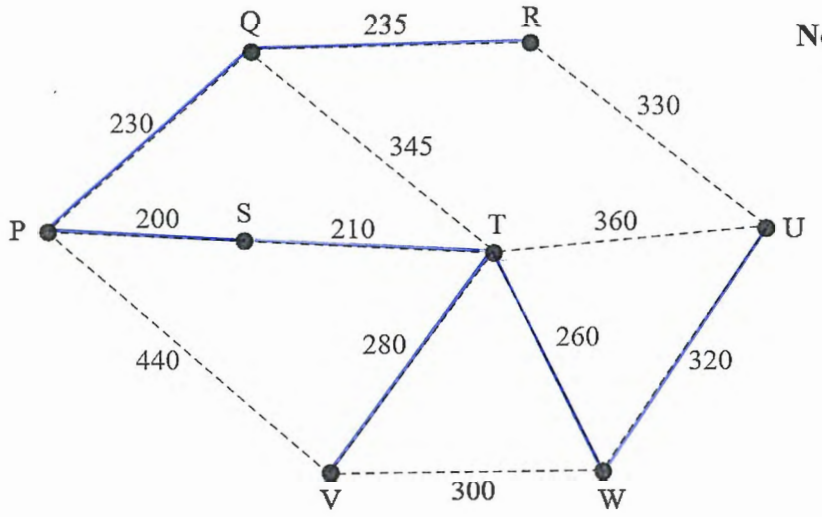
$\therefore 1902.1130\ldots \text{ cm}^3 = (1902.1\dot{8} \times 10^3)\ \text{mm}^3$

$= 1902113.033\ \text{mm}^3$

$\doteq 1902113.03\ \text{mm}^3$

Question 29 (4 marks)

A pipeline network transports natural gas between eight towns.
The length, km of each pipeline is shown below.



Not to scale

a) On the diagram above, draw the minimum spanning tree for the pipeline network. **2**

b) Referring to your answer in part a), determine whether 2 000 kilometres of pipeline is sufficent to connect the eight towns. Justify your answer. **2**

Minimum total pipeline length
= 235 + 230 + 200 + 210 + 280 + 260 + 320
= 1735 km

Since 1735 km < 2 000 km
2000 km is sufficient to connect the towns.

Question 30 (5 marks)

A café owner at Manly recorded the average daily temperature, $T\,(^{\circ}C)$, and the number of iced coffees, N, sold on 10 different consecutive days over the summer season.
The table below shows the results.

Day	1	2	3	4	5	6	7	8	9	10
Temperature (T)	21	23	24	27	29	28	30	32	26	29
Number of Iced Coffees (N)	42	51	49	58	74	60	75	74	55	80

a) Calculate Pearsons' Correlation Coefficient, correct to three decimal places. **1**

$r = 0.9127\ldots \doteq 0.913$ (3dp)

b) Identify the strength of the linear association between temperature and the number of iced coffees sold. **1**

Strong association.

c) Find the equation of the least-squares regression line in terms of temperature (T) and Number of iced coffees sold (N). Express each value correct to two decimal places. **1**

$N = 3.50T - 32.26$

d) On the 11th day the average daily temperature was $31^{\circ}C$.

Estimate the number of iced coffees sold on this day using the least-squares regression line equation. **1**

when $T = 31$, $N = 3.50(31) - 32.26$

$= 76.24$

$\doteq$ 76 coffees.

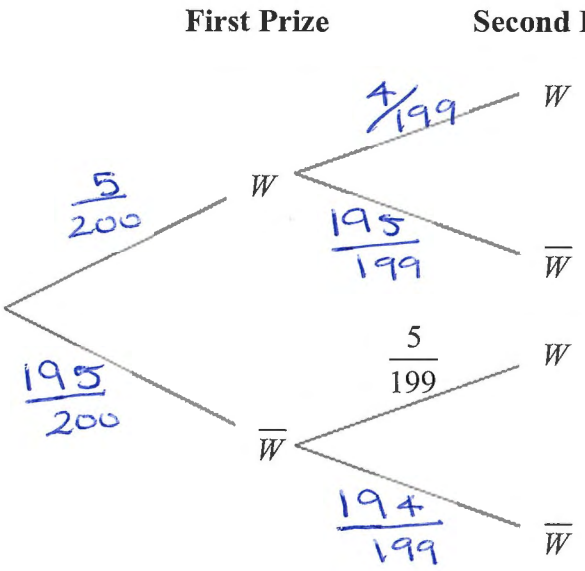
e) Would it be appropriate to use the line of best fit to estimate the number of coffees sold on a day when the average temperature is $9^{\circ}C$? Give a reason for your answer. **1**

when $T = 9°$ $N = 3.50(9) - 32.26 = -0.76$

∴ No, it would not be reasonable to extrapolate when $T = 9°$ as $N < 0$, not able to have negative number of coffees.

Question 31 (3 marks)

Two hundred tickets are sold in a raffle in which there are two prizes.
Amanda purchased five tickets in the raffle. The first ticket drawn wins the first prize, while the second ticket drawn wins the second prize.



Complete the tree diagram by including the missing probabilities.
Calculate the probability that Amanda wins at least one of the prizes. **3**

P(Amanda wins at least one prize)

$= 1 - P(\bar{W}\bar{W})$

$= 1 - \frac{195}{200} \times \frac{194}{199}$

$= 1 - \frac{37830}{39800}$

$= \frac{197}{3980}$

OR

$P(WW) + P(W\bar{W}) + P(\bar{W}W)$

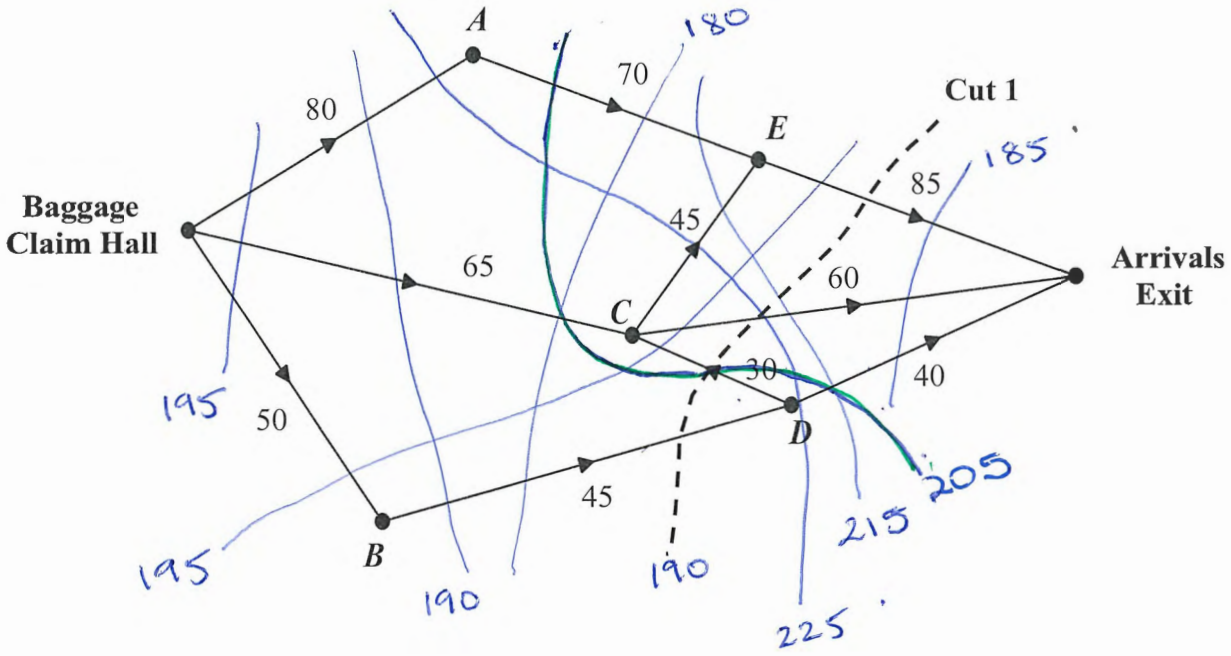
$\frac{5}{200} \times \frac{4}{199} + \frac{5}{200} \times \frac{195}{199} + \frac{195}{200} \times \frac{5}{199}$

$= \frac{197}{3980}$

Question 32 (4 marks)

The network diagram below shows the baggage collection system at an airport. Suitcases arrive at the Baggage Claim Hall and must reach the Arrivals Exit.

The points *A, B, C, D* and *E* are sorting, and transfer areas and 10 conveyor belts operate between the points. The numbers on the conveyor belts represent the maximum number of suitcases per minute that can be transported along each conveyor belt.

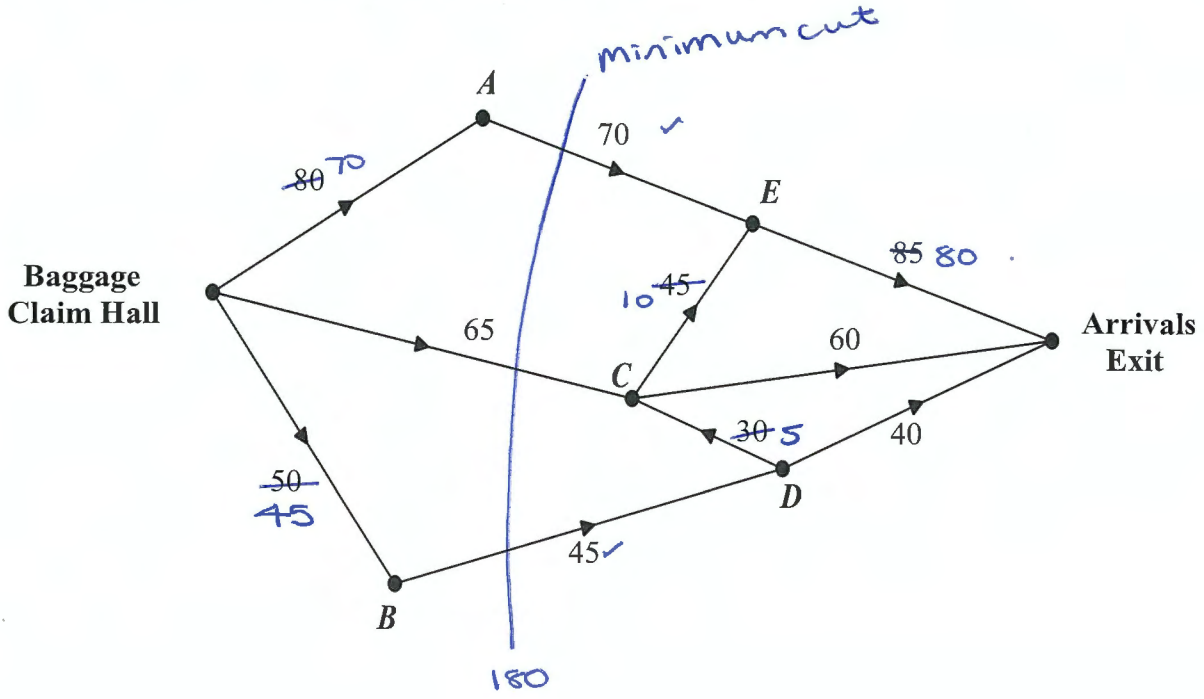


a) What is the capacity of Cut 1 shown on the network diagram above? **1**

Capacity of cut 1 = 85 + 60 + 45

= 190 suitcases/min

b) Draw the minimum cut on the network diagram below. **1**



c) What is the maximum number of suitcases that can pass through the airport per minute? **1**

Maximum # of Suitcases/min = minimum cut.

∴ 180 Suitcases/min

d) The airport would like to increase the maximum number of suitcases that can flow through the airport.
Suggest a change that the airport could make to one of the conveyor belts to allow for an increase of 5 suitcases per minute. **1**

Increase BD to 50 suitcases/minute.

OR Increase AE to 79 suitcases/minute.

OR Increase BC to C to 70 suitcases/minute.

i.e. Any edge along the minimum cut.

Question 33 continues on page 30

Question 33 (5 marks)

A wildlife sanctuary is breeding an endangered species of turtle.

The population is modelled by the equation:

$$P = 150(1+r)^t$$

where r is the annual rate of population increase and t is the number of years since the beginning of 2020.

a) How many turtles were at the beginning of the program? **1**

When $t=0$ $P=150$.

b) By the end of 2025, the population of the turtles was 338.

What was the annual percentage rate of increase in the population of turtles from the beginning of 2020 to the end of 2025. Give answer correct to one decimal place? **2**

Many took $t=5$

$t=6$, $P=150(1+r)^6 = 338$

$(1+r)^6 = \frac{338}{150}$

$1+r = \sqrt[6]{\frac{338}{150}}$

$= 1.14499...$

$\therefore r = 1.14499... - 1$

$= 0.14499... \times 100\%$

$\therefore$ annual percentage increase $= 14.5\%$

c) To prevent overcrowding, the sanctuary plans to release 120 turtles into the wild at the beginning of 2028. Determine, how many turtles will remain in the sanctuary immediately after the release. **2**

When $t=8$ $P = 150(1.145)^8 - 120$

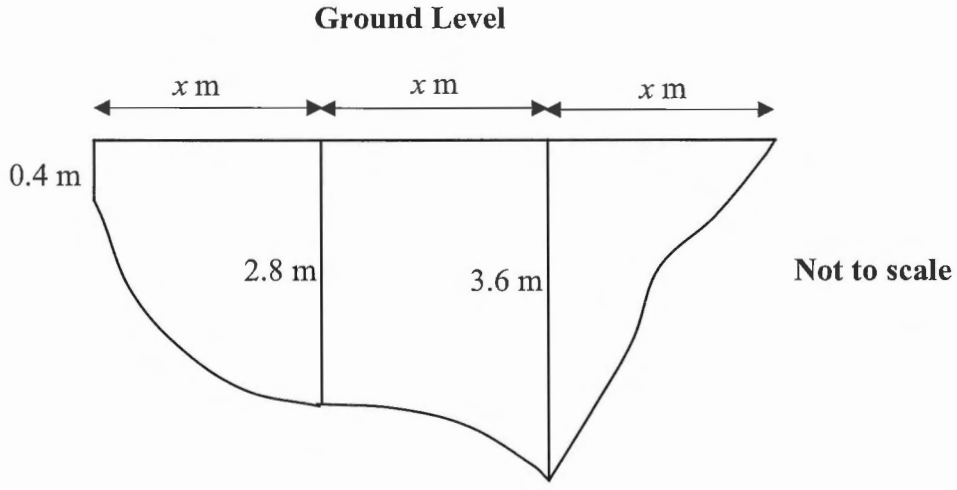
$= 443.134 - 120$

$= 323.13...$

$\therefore$ 323 turtles remain in the sanctuary

Question 34 (3 marks)

A surveyor measured the cross-section of a stormwater drainage channel.
The estimated cross-sectional area is 23.1 square metres using three applications of the trapezoidal rule.



Determine the distance x m between each survey point. Show all working. **3**

$A = \frac{x}{2}(0.4 + 2.8) + \frac{x}{2}(2.8 + 3.6) + \frac{x}{2}(3.6 + 0) = 23.1$

$\frac{x}{2}(0.4 + 2.8 + 2.8 + 3.6 + 3.6) = 23.1$

$13.2x = 46.2$

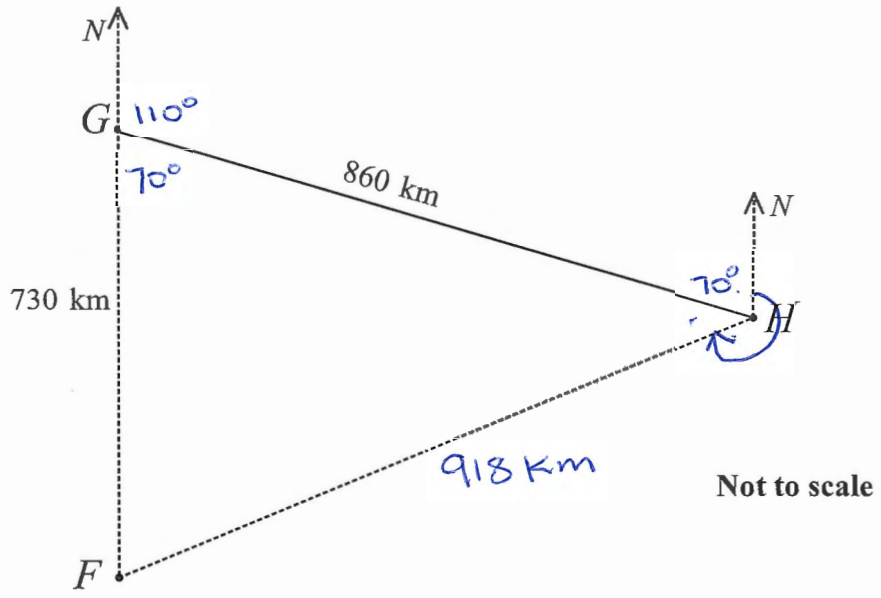
$x = \frac{46.2}{13.2}$

$= 3.5$

Question 35 continues on page 32

Question 35 (5 marks)

The diagram below shows the location of three cities and the airline routes connecting them.



City H is 860 km from city G on a bearing of 110°.

City F is 730 km due south of city G.

Find the distance and bearing of city F from city H. **5**

$FH^2 = FG^2 + GH^2 - 2 \times FG \times FH \cos 70°$

$= 730^2 + 860^2 - 2 \times 730 \times 860 \times \cos 70°$

$= 843059.508$

$\therefore FH = \sqrt{843059.508}$

$= 918.1827\ldots$

$\doteq 918$ (Nearest km)

Finding $\angle FHG$: $\frac{\sin \angle FHG}{730} = \frac{\sin 70°}{918}$

$\therefore \sin \angle FHG = \frac{730 \times \sin 70°}{918}$

$\angle FHG = \sin^{-1}(0.7472\ldots)$

$= 48.35°$

$\therefore$ Bearing of F from H $= 360° - (48.35° + 70°)$

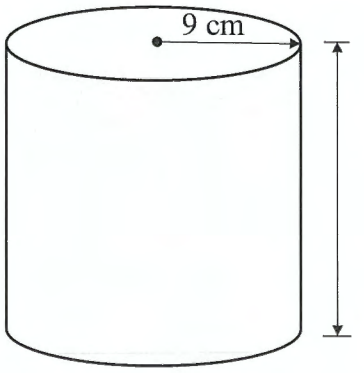
$= 241.647\ldots°$

$= 242°$ (nearest degree).

OR S62°W.

Question 36 (3 marks)

A chocolatier melts a solid cylindrical block of chocolate with radius 9 cm and height 33 cm.
The melted chocolate is moulded into **1 160** identical solid chocolate spheres.
All the chocolate is used in the manufacturing process.



Not to scale

Calculate the radius of each chocolate sphere, correct to one decimal place. **3**

Volume of cylinder $= \pi(9)^2 33$

$= 8397.477\ldots cm^3$

Volume of one Sphere $= 8397.477\ldots \div 1160$

$= 7.239\ldots$

$\therefore \frac{4\pi r^3}{3} = 7.239\ldots$

$r^3 = \frac{3 \times 7.239}{4\pi}$

$r^3 = 1.728$ $\therefore r = \sqrt[3]{1.728} = 1.2$ cm.

Question 37 (5marks)

A small business borrows \$65 000 to purchase new airport baggage handling equipment. The loan is taken out over a period of 5 years at a reducible rate of 6% p.a. charged monthly.

Repayments, R, are made monthly.

Using the table of present value interest factors below and the recurrence relation,

$$A_{n+1} = A_n(1+r) - R$$

Calculate how much interest has been charged on the loan after the second repayment. 5

Table of present value interest factors for an annuity of \$1

Present Value Interest Factors					
Period	*Interest Rate Per period*				
	0.5%	1%	2%	4%	6%
12	12.8548	11.2552	10.5751	9.3851	8.3842
25	23.8654	22.0232	19.5235	15.6221	12.7834
36	32.8710	30.1075	25.4888	18.9803	14.6210
48	42.5803	37.9740	30.6731	21.1951	15.6500
60	51.7256	44.9550	34.7609	22.6235	16.1614
120	90.0735	69.7005	45.3554	24.7741	16.6514
240	139.5808	90.8194	49.5686	24.9980	16.6667

PV = PVIF × a

$\frac{6\% \text{ p.a.}}{12} = 0.5\%$ /mth

$\therefore 65000 = 51.7256 \times a$

$n = 5 \times 12 = 60$

$\therefore a = \frac{65000}{51.7256}$

$= \$1256.631146$

$A_1 = A_0(1+r) - R$

$A_1 = \$65000\left(1 + \frac{.05}{100}\right) - \$1256.631146$

$\therefore A_1 = \$64068.36885$

$A_2 = \$64068.36885(1.005) - \$1256.631146$

$= \$63132.07955$

$\therefore$ Amount owing after 2nd repayment is

$\$63132.07955$

Reduction in the loan:

$\$65000 - \$63132.07955 = \$1867.920448$.

Total paid $= 2 \times \$1256.631146$

$= \$2513.262292$

$\therefore$ Interest charged = Total paid − Reduction in the loan

$= \$2513.262292 - \$1867.920448$

$= \$645.341844$

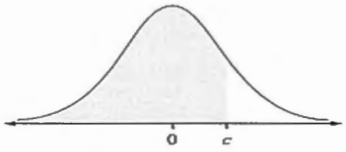
$\doteq \$645.34$.

* Accept rounding to 2dp.
* Other ways to approach finding interest.

Question 38 continues on page 36

Question 38 (6 marks)

The standard normal distribution table below represents the area under the normal curve to the left of the z-score.



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.50000	.50399	.50798	.51197	.51595	.51994	.52392	.52790	.53188	.53586
0.1	.53983	.54380	.54776	.55172	.55567	.55966	.56360	.56749	.57142	.57535
0.2	.57926	.58317	.58706	.59095	.59483	.59871	.60257	.60642	.61026	.61409
0.3	.61791	.62172	.62552	.62930	.63307	.63683	.64058	.64431	.64803	.65173
0.4	.65542	.65910	.66276	.66640	.67003	.67364	.67724	.68082	.68439	.68793
0.5	.69146	.69497	.69847	.70194	.70540	.70884	.71226	.71566	.71904	.72240
0.6	.72575	.72907	.73237	.73565	.73891	.74215	.74537	.74857	.75175	.75490
0.7	.75804	.76115	.76424	.76730	.77035	.77337	.77637	.77935	.78230	.78524
0.8	.78814	.79103	.79389	.79673	.79955	.80234	.80511	.80785	.81057	.81327
0.9	.81594	.81859	.82121	.82381	.82639	.82894	.83147	.83398	.83646	.83891
1.0	.84134	.84375	.84614	.84849	.85083	.85314	.85543	.85769	.85993	.86214
1.1	.86433	.86650	.86864	.87076	.87286	.87493	.87698	.87900	.88100	.88298
1.2	.88493	.88686	.88877	.89065	.89251	.89435	.89617	.89796	.89973	.90147
1.3	.90320	.90490	.90658	.90824	.90988	.91149	.91308	.91466	.91621	.91774
1.4	.91924	.92073	.92220	.92364	.92507	.92647	.92785	.92922	.93056	.93189
1.5	.93319	.93448	.93574	.93699	.93822	.93943	.94062	.94179	.94295	.94408

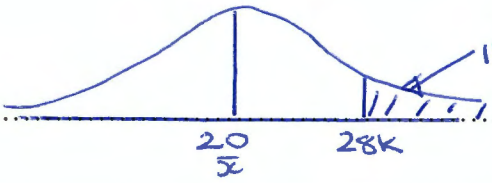
The weight of checked baggage at an international airport is normally distributed.
The mean baggage weight is 20 kg and standard deviation σ kg is unknown.

The classification of bags at the airport is as follows:

Weight of bag W kg	$W < 14$	$14 \leq W \leq 32$	$W > 32$
Classification	small	medium	large

The airport manager knows that 15.866% of bags weigh more than 28 kg.

a) Calculate the value of σ. **2**



$P(W < 28\text{Kg}) = 1 - 0.15866$

$= 0.84134$

$\therefore Z = 1$ from table.

$Z = \frac{x - \mu}{\sigma}$

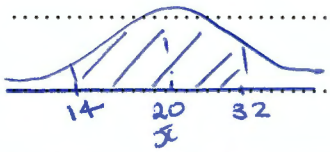
$1 = \frac{28 - 20}{\sigma}$ $\quad \therefore \sigma = 28 - 20 = 8$

b) The airport expects 18 600 passengers to check in baggage during a holiday period.

Estimate the number of passengers who will have a bag that is classified as medium weight. Give your answer to the nearest whole passenger. **4**

$P(14 \leq W \leq 32) = P(W \leq 32) - P(W \leq 14)$

$= P(Z \leq 1.5) - P(Z \leq -0.75)$



$= 0.93319 - [1 - P(Z < 0.75)]$

$= 0.93319 - (1 - 0.77337)$

$= 0.93319 - 0.22663$

$= 0.70656$

Z-Scores:

$Z = \frac{32 - 20}{8} = 1.5$

$Z = \frac{14 - 20}{8} = -0.75$

Expected # $= 0.70656 \times 18600$

$= 13142.016$

$\doteq 13142$ people.

Question 39 (5 marks)

The table below lists activities for the construction of a community sports pavilion. Some durations are unknown (*marked* ?)

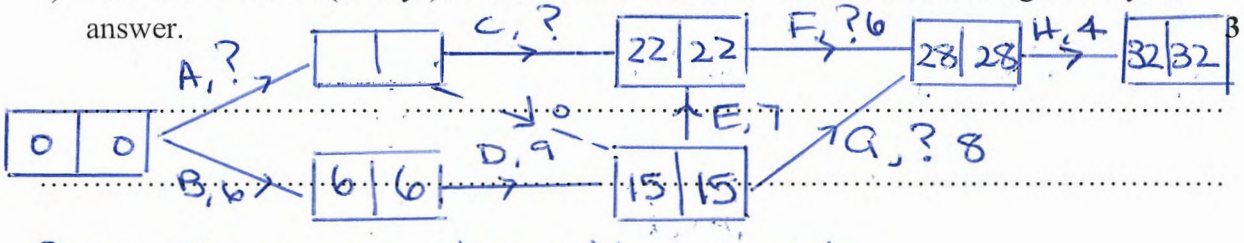
Activity	Prerequisites	Duration (days)
A	-	?
B	-	6
C	A	?
D	B	9
E	A, D	7
F	C, E	?
G	D	?
H	F, G	4

The minimum completion time for the project is 32 days.

The critical path includes **B, D, E, F** and **H** only.

The float time for activity **G** is 5 days, and the float time for activity **C** is 4 days.

a) *Find the durations (in days) for activities* **F** *and* **G**. *Include a network diagram in your* answer.



B, D, E, F & H are on the critical path:

$\therefore 6 + 9 + 7 + F + 4 = 32$

$F + 26 = 32$

$\therefore F = 6$ days.

Float time for G is 5 days.

$\therefore 28 - 15 - G = 5$

$13 - G = 5$

$-G = -8$

$G = 8$ days.

b) Find the range of durations possible for activities **A** and **C**, assuming whole number durations. **2**

Float time for C is 4 days and F starts day 22

C must finish by day 18. F is on critical path.

$\therefore A + C = 18$

B and D are on the critical path

$\therefore A < 15$ days and $A \geq 1$ day

$\therefore$ Range: $1 \leq A < 15$ OR $1 \leq A \leq 14$ days

$C = 18 - A$

$\therefore 4 \leq C \leq 17$ days OR $3 < C < 18$ days.

End of Assessment Task