Gosford High School

2023 **TRIAL HIGHER SCHOOL CERTIFICATE EXAMINATION**

Mathematics Standard 2

General Instructions
- Reading time – 10 minutes
- Working time – 2 hours 30 minutes
- Write using black pen
- NESA approved calculators may be used
- A reference sheet is provided at the back of this paper
- For questions in Section II, show relevant mathematical reasoning and/or calculations

Total marks: 100

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

Section II – 85 marks
- Attempt Questions 16-43
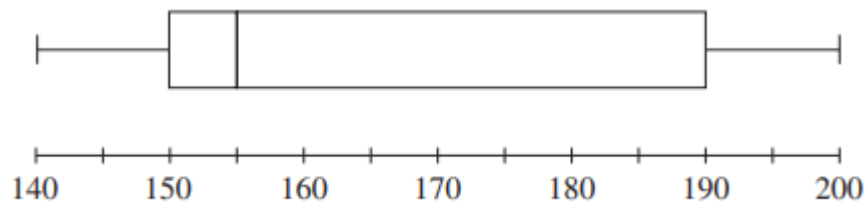- Allow about 2 hours and 5 minutes for this section

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

1   A set of data is displayed in this box-and-whisker plot.

Which of the following best describes this set of data?

A. Symmetrical

B. Positively skewed

C. Negatively skewed

D. Normally distributed

2   Koddy, "a revhead" is the driver at fault in a car accident. Which of the following is covered by Koddy's compulsory third-party (CTP) insurance?

A. Repairs to Koddy's car

B. Injury to the other driver

C. Damage to the other driver's car

D. Cost of repairing a building damaged in the accident

3 The locations of three towns, *A*, *B* and *C*, are shown below. *C* is due south of *A*.

North

Not to scale

A

48°

C   *B*
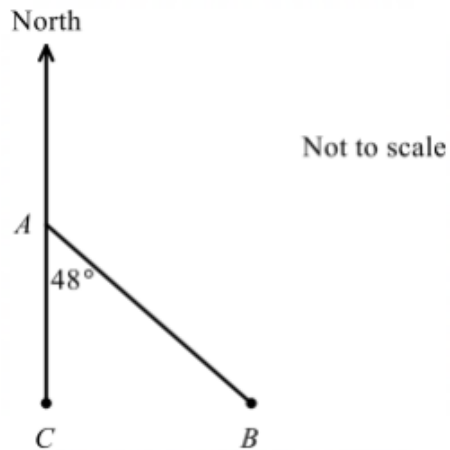
What is the bearing of town A from town B?

A. 048°

B. 132°

C. 228°

D. 312°

4 The Pareto chart shows the orders received by business over 5 months.
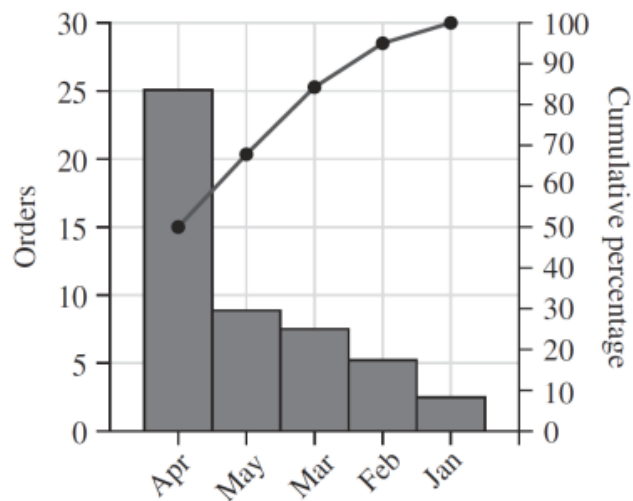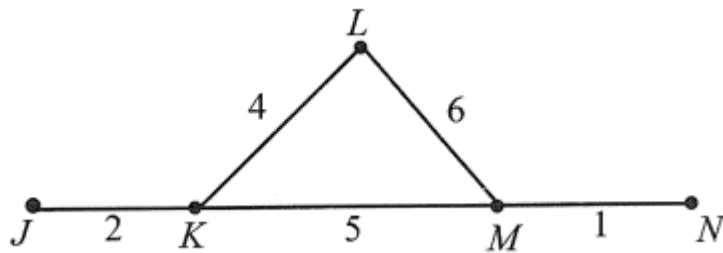

What percentage of orders were received in May?

A. 69%

B. 45%

C. 30%

D. 18%

5   The price of a loaf of bread is $2.85.

Given that the price is only increasing due to inflation at a rate of 1.3% per annum, what is the expected price of a loaf of bread after 14 years?

A. $3.37

B. $3.41

C. $4.15

D. $6.26

6   A weighted network is shown below.

What is the weight of the minimum spanning tree?

A. 8

B. 12

C. 13

D. 18

7   Finley bought a car for $30,000. He made a deposit of $2200 and agreed to payments of $820 per month for four years. What is the total amount of interest paid for the loan?

A. $9360

B. $11560

C. $39360

D. $41560

8 The graph of $y = 3^x$ is

A. a straight line

B. a parabola

C. a hyperbola

D. an exponential

9 A random variable is normally distributed with mean 0 and standard deviation 1. The table gives the probability that this random variable lies between 0 and z for different values of z.

z	0.1	0.2	0.3	0.4	0.5	0.6
Probability	0.0398	0.0793	0.1179	0.1554	0.1915	0.2257

The probability values given in the table for different values of z are represented by the shaded area in the following diagram.
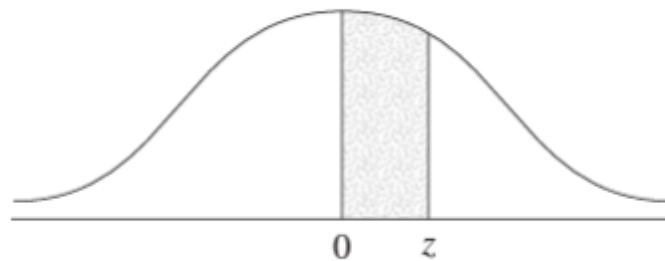

Using the table, what is the probability that a value from a random variable that is normally distributed with mean 0 and standard deviation 1 is greater than 0.6.

A. 0.1554

B. 0.2257

C. 0.2743

D. 0.7743

10 A survey was conducted where people were asked which of two brands of smartphones they preferred. The results were:

• 48% preferred Brand X

• 52% preferred Brand Y.

A graph displaying the data is to be included in a magazine article. The editor of the magazine wishes to ensure that the graph is not misleading in any way. Which graph should the editor choose to include in the article?
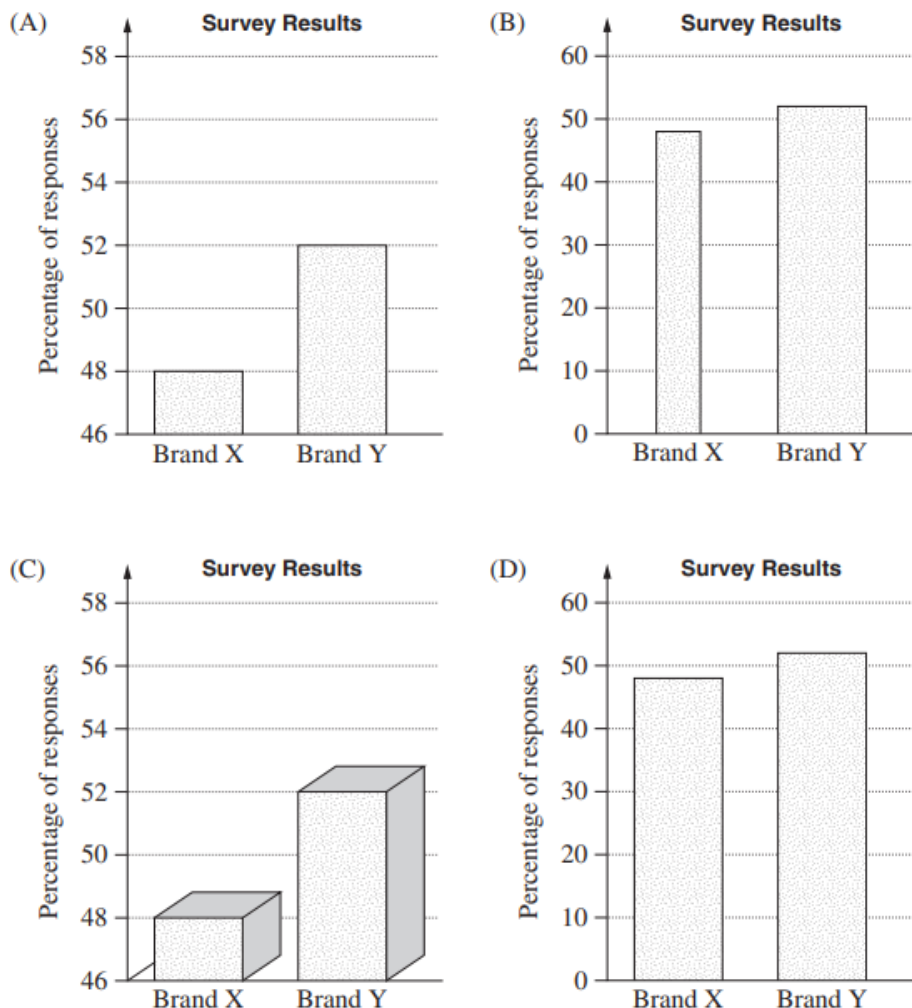
**11** Ava and Lily each invest $8000. Ava's investment earns simple interest at a rate of 7.5% per annum. Lily's investment earns interest at the rate of 7.5% per annum compounding annually. At the end of three years, correct to the nearest cent, Ava will have:

A. $138.38 less than Lily

B. $138.38 more than Lily

C. $211.57 less than Lily

D. $211.57 more than Lily

12 Three years ago an appliance was valued at $2467. Its value has depreciated by 15% each year, based on the declining-balance method. What is its salvage value today, to the nearest dollar?

A. $952

B. $1110

C. $1357

D. $1515

13 A flight between Sydney and the USA takes 14 hours, to the nearest hour. Find the percentage error in measurement, correct to 2 decimal places.

A. 0.04%

B. 2.14%

C. 3.57%

D. 5.88%

14 A collection of bushwalking tracks is modelled by the network below. There are 6 lookout points, labelled A, B, C, D, E and F. Which two edges should be removed so that a bushwalker can walk along every track exactly once and still visit every lookout?
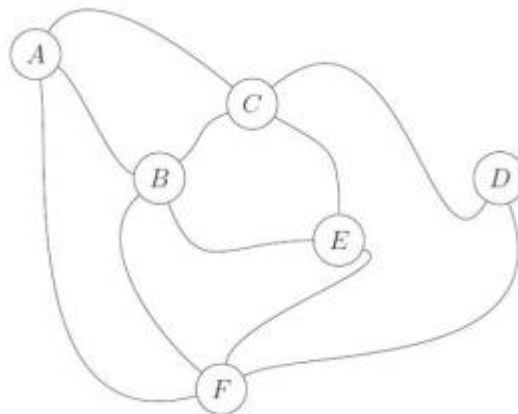
A. AB and BE

B. BC and BF

C. CD and DF

D. EC and BF

15 The triangle below has an area of $18cm^2$.

$150°$ $2x$ cm Not to scale

x cm
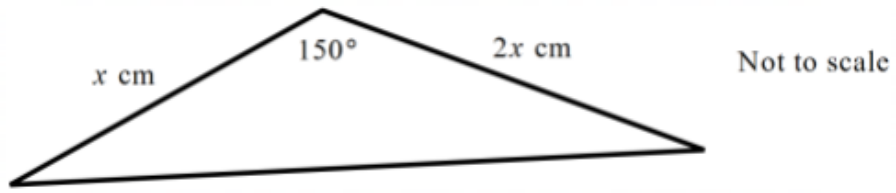
What is the value of x?

A. 3 cm

B. 6 cm

C. 12 cm

D. 24 cm

Section II

85 marks
Attempt all questions
Allow about 2 hours and 5 minutes for this section

Answer the questions in the spaces provided.
Your responses should include relevant mathematical reasoning and/or calculations.
Extra writing space is provided at the back of the examination paper.

Question 16 (1 mark) 1

A regular deck of playing cards contains the same number of cards of each suit hearts, diamonds, spades and clubs.

Caillan conducted an experiment where he randomly selected a card from a regular deck, recorded the suit of the card, returned to the deck and shuffled the cards.

He repeated this experiment 20 times and his results are recorded in the table below.

Hearts	♥	5
Diamonds	♦	4
Spades	♠	4
Clubs	♣	7

Which suit(s) does the experimental probability equal the theoretical probability?

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Question 17 (2 marks) 2

A set of six scores is shown below, where x is the largest of the six scores.

$$9, \; 12, \; 26, \; 32, \; 40, \; x$$

What is the smallest value of x that would be considered an outlier?

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Question 18 (2 marks)   **2**

The graph below shows the depreciation of a laptop over time.
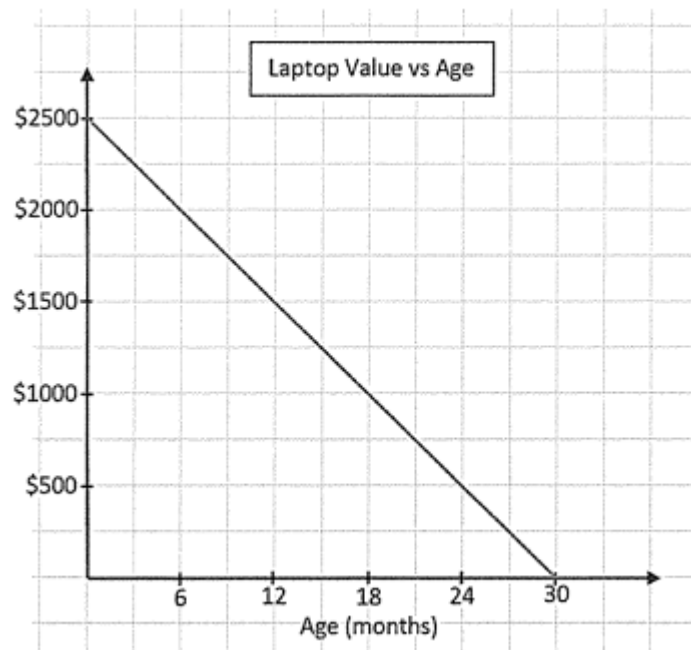
What is the gradient of the line and what does it represent?

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Question 19 (2 marks)   **2**

A patient requires 2400 mL of fluid to be delivered at a constant rate by means of a drip over 12 hours. Each mL of fluid is equivalent to 15 drops.

How many drops per minute need to be delivered?

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Question 20 (2 marks)

(a) The probability that Arabella will score more than 100 points in a game of bowling is $\frac{21}{30}$. **1**

Isabella states that the probability that Arabella will score less than 100 points in a game of

bowling is $\frac{9}{30}$.

Is Isabella correct? Give a reason for your answer.

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(b) Arabella plays two games of bowling. What is the probability that she scores more than 100 points
in the first game and then again in the second game? **1**

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Question 21 (2 marks) **2**

Five boxes with varying weight are arranged from lightest to heaviest, left to right.
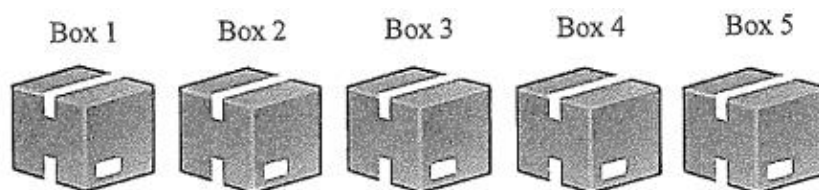
Box 1   Box 2   Box 3   Box 4   Box 5

The following data is given about the boxes.

Mode: 0.6 kg   Mean: 1.2 kg   Median: 0.9 kg   Range: 1.5 kg

Write above each box its weight.

Question 22 (3 marks)   **3**

The capture-recapture technique was used to estimate a population of koalas in a national park in 2023.

- 48 koalas were caught, tagged and released.

- Later, 45 koalas were caught at random.

- 9 of these 45 koalas had been tagged.

The estimated population of koalas in 2023 was 20% less than the estimated population for 2016. What was the estimated population for 2016?

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Question 23 (3 marks)   **3**

A shape consisting of a quadrant and a right-angled triangle is shown.

NOT TO SCALE

6 cm

10 cm
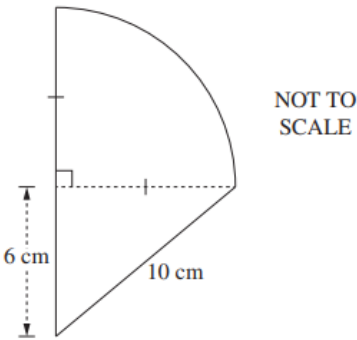
What is the perimeter of this shape, correct to one decimal place?

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Question 24 (2 marks)   **2**

Will purchased 200 BHP shares at $42.56 per share. The brokerage fee for the purchase was $9.95.

Will was paid a dividend of $1.20 per share, then immediately sells the shares for $45.31 each. The brokerage fee for the sale was $9.95.

What was Will's total profit?

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Question 25 (2 marks)   **2**

Emily watches television for three hours every day. Her television uses 350 watts per hour and her electricity is charged at 37.56 cents per kWh.

How much does it cost Emily to run her television for a year?

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Question 26 (2 marks)   **2**

Clark's formula is used to determine the dosage of medicine for children.

$$\text{Dosage} = \frac{\text{weight in kg} \times \text{adult dosage}}{70}$$

The adult daily dosage of a medicine contains 3150 mg of a particular drug. Baby Sophia who weighs 35 kg is to be given tablets each containing 525 mg of this drug. How many tablets should Sophia be given daily?

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Question 27 (2 marks)   **2**

Jack is driving on the M1 at a speed of 110 km/h and has to break suddenly. He has a reaction time of two seconds and the breaking distance of 59.2 metres. Calculated his stopping distance correct to one decimal place..

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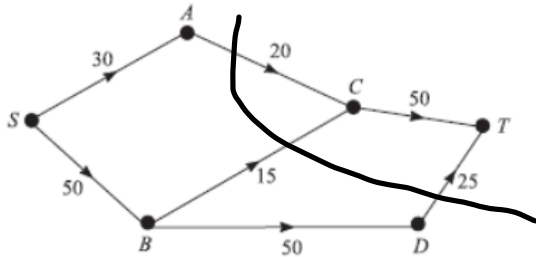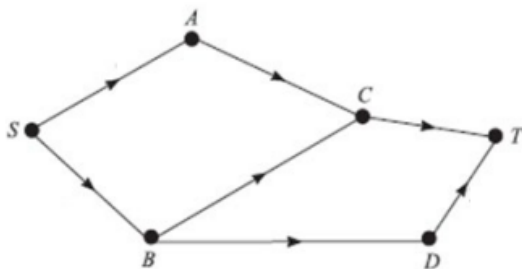**Question 28** (2 marks)   **2**

The network diagram below flows from the source (S) to sink (T).

The minimum cut is 60 as shown. Re-label the entire network diagram, by changing the weight of exactly two of the edges to increase the maximum flow to 80. Circle the two changes you have made.

Question 29 (3 marks)   **3**

Jack, the greatest butcher on the Central Coast, earns a yearly salary of $63752. His annual leave loading is $17\frac{1}{2}\%$ of four weeks' pay.

Calculate his total pay for his four weeks of annual leave.

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Question 30 (3 marks)

Approximately 71% of Earth's surface is covered by water. Assume Earth is a sphere with radius 6400 **3** km.

Calculate the number of square kilometres covered by water. Give your answer in scientific notation, correct to one decimal place.

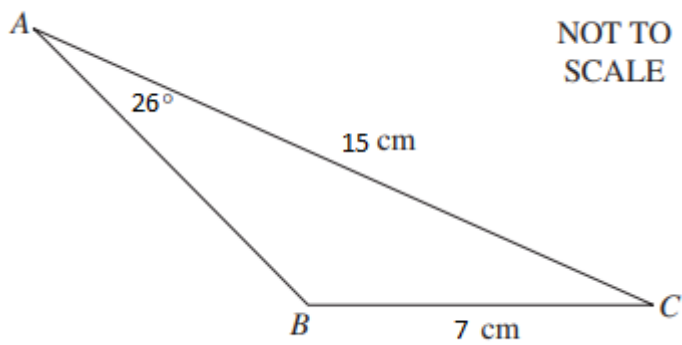…….

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Question 31 (3 marks)   **3**

Find the size of the obtuse angle ABC, correct to the nearest degree.

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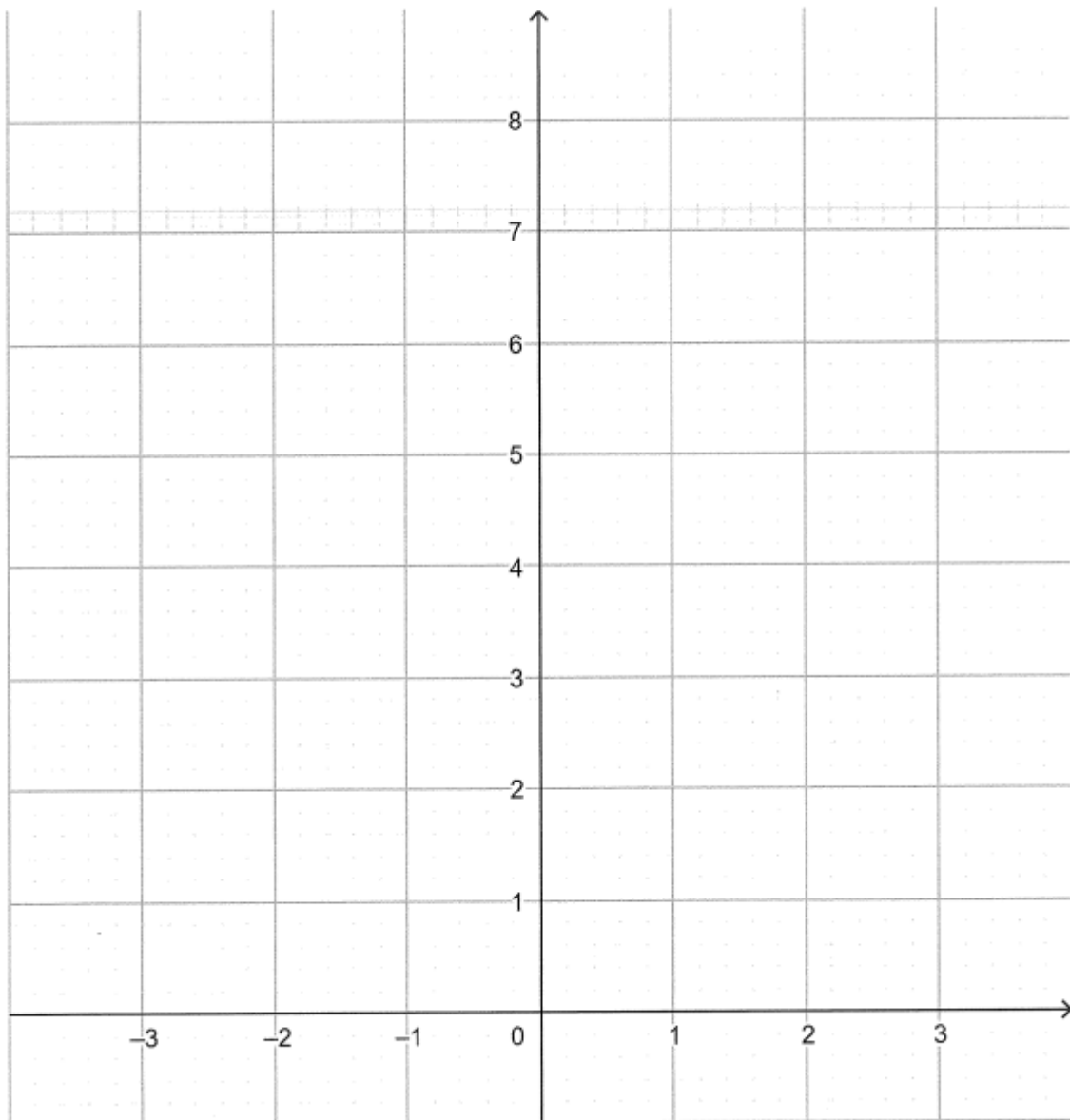**Question 32** (3 marks)   **3**

Graph the following pair of equations and identify the coordinates of the point of intersection of the two lines.
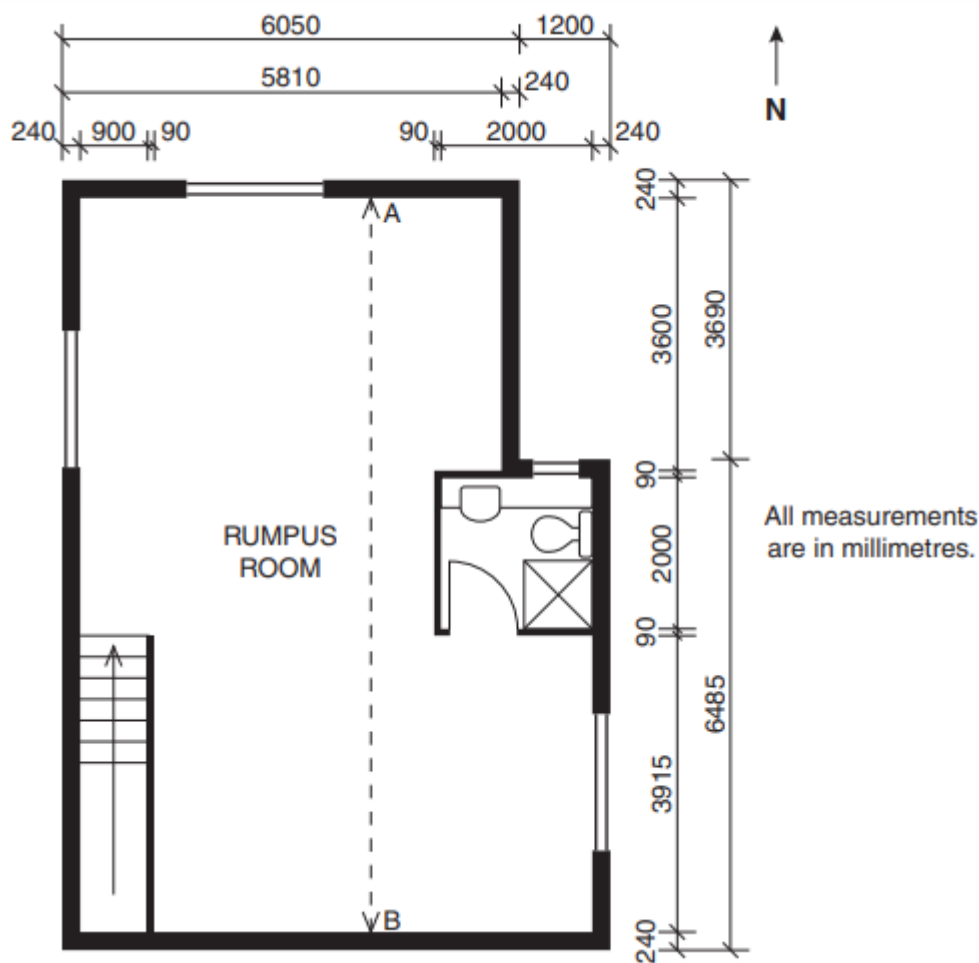
$$y = 2x + 7 \qquad\qquad x - 2y + 8 = 0$$

Coordinates of the point of intersection = ………………………..

Question 33 (4 marks)

Part of the floor plan of a house is shown. The plan is drawn to scale.

(a) Use the plan, the to find the dimensions of the bathroom, in millimetres?   **1**

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(b) Use the plan to find the length of AB, the internal length of the rumpus room, in millimetres   **1**

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(c) Calculate the scale of the plan. There are three identical windows to be purchased for this rumpus   **2**
room. Use the scale of the plan to find the width of the windows to be purchased. Give your answer in
millimetres.

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Question 34 (4 marks)

A movie theatre has 200 seats. Each ticket currently costs $8.

The theatre owners are currently selling all 200 tickets for each session. They decide to increase the price of tickets to see if they can increase the income earned from each movie session.

It is assumed that for each one dollar increase in ticket price, there will be 10 fewer tickets sold.

A graph showing the relationship between an increase in ticket price and the income is shown below.
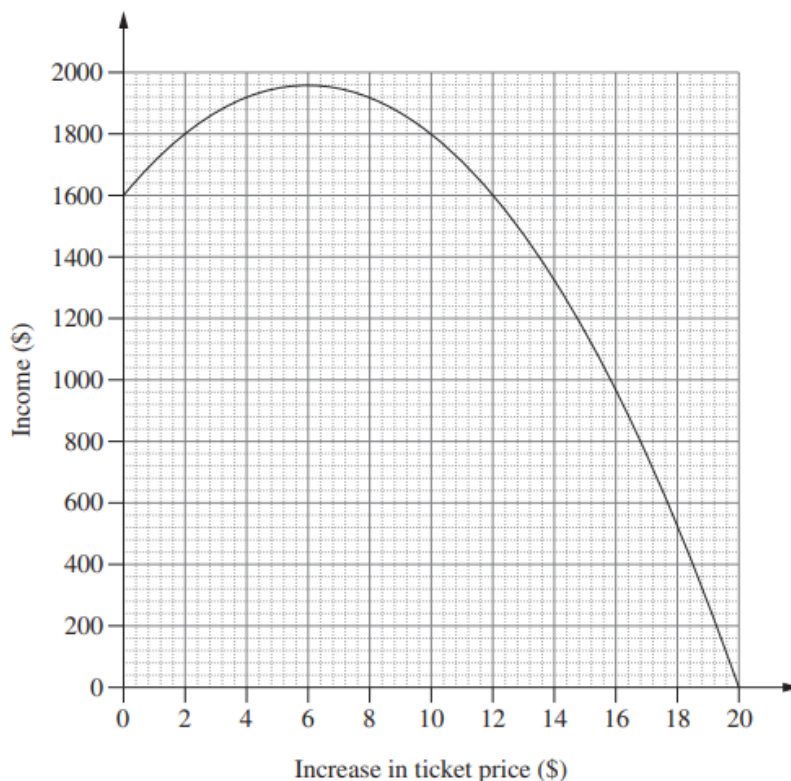
(a) What ticket price should be charged to maximise the income from a movie session?

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(b) What is the number of tickets sold when the income is maximised?

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(c) The cost to the theatre owners of running each session is $500 plus $2 per ticket sold. Calculate the profit earned by the theatre owners when the income earned from a session is maximised.
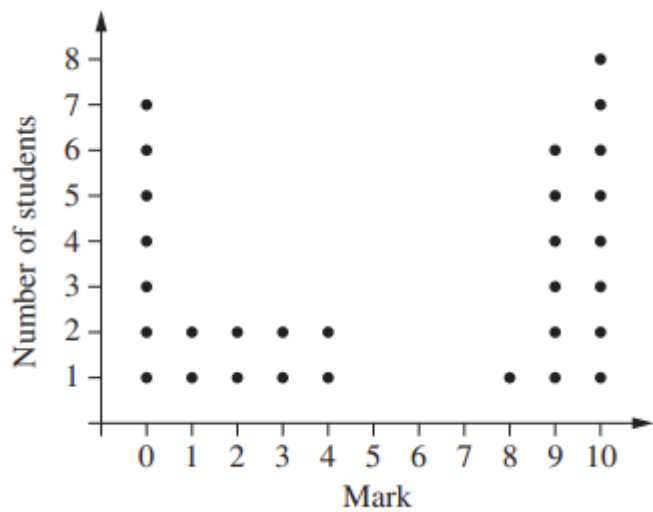
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Question 35 (4 marks)

All the students in a class of 30 did a test.

The marks, out of 10, are shown in the dot plot.

(a) Find the standard deviation, correct to two decimal places.   **1**

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(b) The mean test mark is 5.4. Using the dot plot, calculate the percentage of the marks which lie   **1**
within one standard deviation of the mean.

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(c) Amanda states that for any data set, 68% of the scores should lie within one standard deviation of
the mean. With reference to the dot plot, explain why the Amanda's statement is NOT relevant in this   **1**
context.

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Question 36 (3 marks)

The results of two class tests are normally distributed. The means and standard deviations of the tests are displayed in the table.

	Test 1	Test 2
Mean (μ)	60	58
Standard Deviation (σ)	6.2	6

(a) Zara scored 63 in Test 1 and 62 in Test 2. She states he has performed better in Test 1 than Test 2 relative to the class. Justify whether you agree or disagree with her statement with appropriate calculations.

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(b) If 150 students sat Test 2, how many students would you expect to have scored less than 64?

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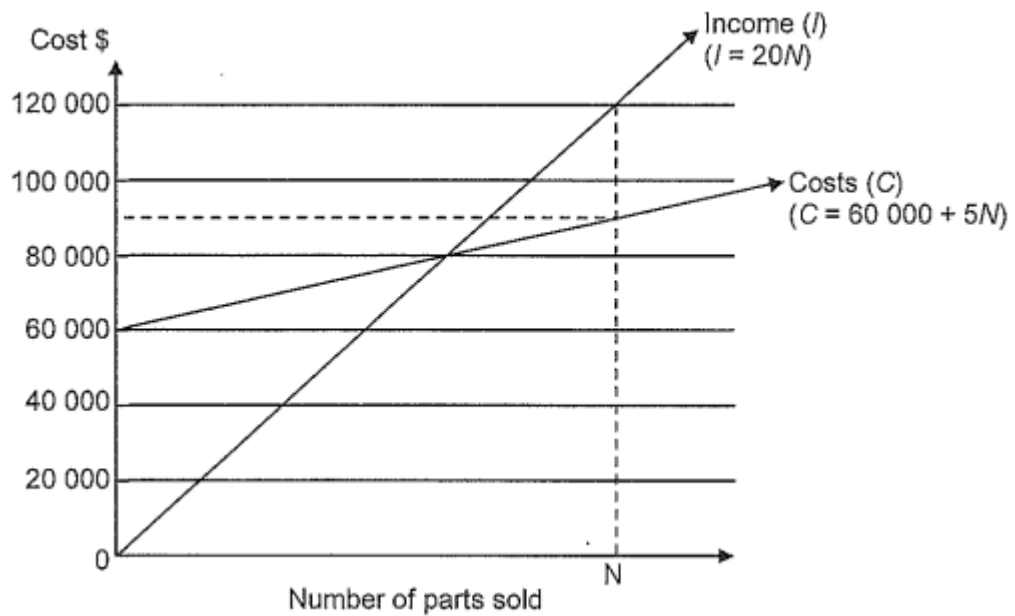…….

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Question 37 (5 marks)

A manufacturer spends $60,000 for a machine which produces a specific part for jet engines.

The graphs and equations representing the manufacturers cost (C) and income (I) from the sale of the parts are shown on the diagram below.

(a) At the break even point, how many parts are sold?

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(b) What profit is made per part, when N parts are sold?

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Question 38 (4 marks)

A random variable is normally distributed with a mean 0 and standard deviation 1. The probability values given in the table for different values of z are represented by the shaded area in the diagram below the table.

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817

(a) Using the table, find P(z< 1.16)

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(b) The arm span (in metres) for a group of 10000 residents of a town are normally distributed with a mean of 1.68 metres and a standard deviation of 0.24 metres.

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Alexa has an arm span of 1.4832 metres.

Calculate the z-score of Alexa's arm span.

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(c) Determine how many of the residents are expected to have an arm span less than 1.4832 metres. **2**

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The network below shows the activities that need to occur for a project to be completed.
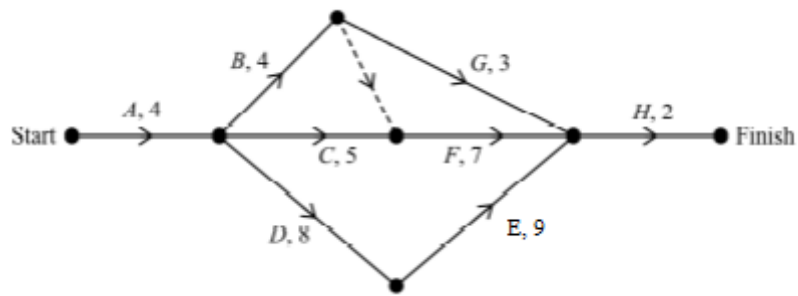
Complete the activity table below for the network shown.

Activity	Duration	Immediate predecessor
A	4	
B	4	A
C	5	A
D	8	A
E	9	D
F	7	B, C
G	3	B
H	2	E, F, G

Question 40 (5 marks) 5

OXY is a sector of a circle with an angle of 50° at the centre and radius 1200 millimetres.
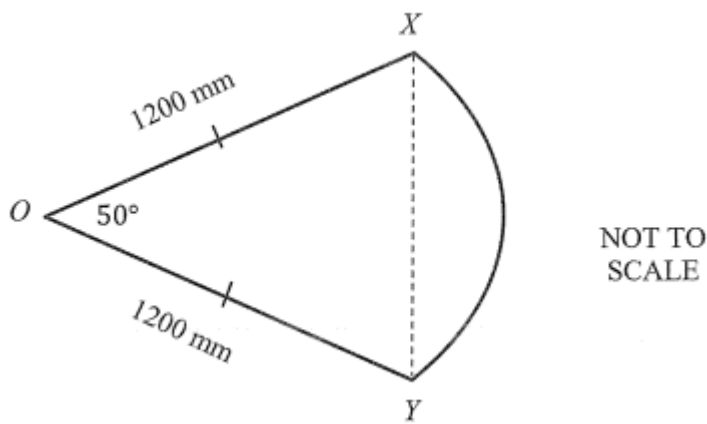
How much longer, to the nearest millimetre, is the arc *XY* than the interval *XY*?

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Question 41 (5 marks)

A house has a roof area of 216 m^2. All the rain that falls onto this roof is diverted into a cylindrical water tank which has a diameter of 3.6m. During a storm, 35 mm of rain falls onto the roof.

(a) Calculate the volume of water that fell onto the roof. Give your answer in m^3.

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(b) Use your answer from part (a) to calculate the increase in the depth of water in the tank due to the rain that falls onto the roof during the storm. Give your answer to two decimal places.
The volume of a cylinder is given by $V = \pi r^2 h$

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Question 42 (4 marks)

Spencer, a football super coach, is studying the relationship between the weight in kilograms of players and their vertical jump in metres. Spencer believes that players who weigh less are able to jump higher.

The data from 10 players is shown in the table below.

weight, (w)	84.5	83.3	58.7	74.1	70.7	72.3	75.8	71.8	63.2	65.9
vertical jump (v)	21.9	20.5	20.8	19.9	20.6	18.8	22.8	20.6	20.0	21.8

(a) Find the equation of the least-squares regression line. Give each value correct to two decimal places. **2**

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(b) By calculating Pearson's correlation coefficient for the data, correct to three decimal places, justify whether the data confirms the association between weight and vertical jump. **2**

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Question 43 (7 marks)

The network diagram shows tasks that must be completed to finish a project. Each edge weight represents the time taken to complete the task, in days.
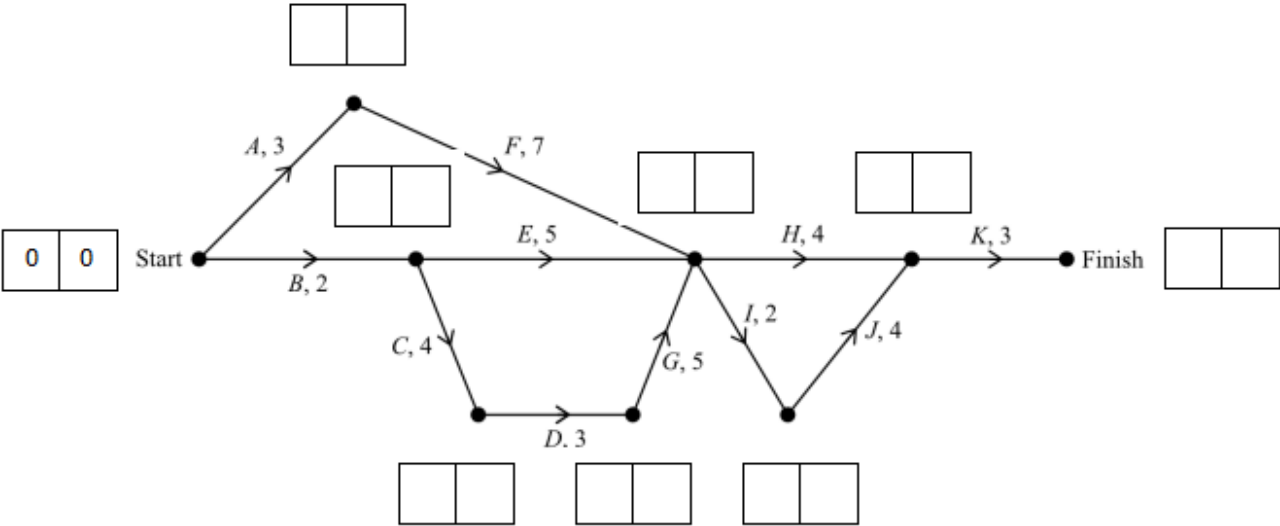
(a) Calculate, on the diagram above, the earliest starting time (EST) and latest starting time (LST) for each activity.

4

(b) What is minimum completion time for the project?

1

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(c) What is the critical path for the project?

1

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(d) What is the float time of activity E?

1

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End of Paper

Year 12 Standard 2 HSC Trial 2023 Solutions

1-15	Multiple Choice Solutions
	1. A ○ B ○ C ● D ○
	2. A ○ B ● C ○ D ○
	3. A ○ B ○ C ○ D ●
	4. A ○ B ○ C ○ D ●
	5. A ○ B ● C ○ D ○
	6. A ○ B ● C ○ D ○
	7. A ○ B ● C ○ D ○
	8. A ○ B ○ C ○ D ●
	9. A ○ B ○ C ● D ○
	10. A ○ B ○ C ○ D ●
	11. A ● B ○ C ○ D ○
	12. A ○ B ○ C ○ D ●
	13. A ○ B ○ C ● D ○
	14. A ● B ○ C ○ D ○
	15. A ○ B ● C ○ D ○

16	A regular deck of playing cards contains the same number of cards of each suit hearts, diamonds, spades and clubs.

Caillan conducted an experiment where he randomly selected a card from a regular deck, recorded the suit of the card, returned to the deck and shuffled the cards.

He repeated this experiment 20 times and his results are recorded in the table below.

Hearts	♥	5
Diamonds	♦	4
Spades	♠	4
Clubs	♣	7

Which suit(s) does the experimental probability equal the theoretical probability?

Solution

$$Sample\ Space = 5 + 4 + 4 + 7 = 20$$

$$P(hearts) = \frac{5}{20} = \frac{1}{4}$$

$$P(diamonds) = \frac{4}{20} = \frac{1}{5}$$

$$P(spades) = \frac{4}{20} = \frac{1}{5}$$

$$P(clubs) = \frac{7}{25}$$

$\therefore P(hearts)$ has the theoretical probability equal to the experimental probability.

Marking Guideline

1 mark	Correct Solution.
0 marks	Incorrect Solution.

Markers Feedback

This question was very well done.

| 17 | A set of six scores is shown below, where x is the largest of the six scores. |

$$9, \ 12, \ 26, \ 32, \ 40, \ x$$

What is the smallest value of x that would be considered an outlier?

Solution

$$IQR = 40 - 12 = 28$$

$$Outlier_{upper} = Q_3 + 1.5IQR$$

$$= 40 + 1.5(28)$$

$$= 82$$

Any number above 82 is considered an outlier, so the smallest would be 83.

Marking Guideline

2 marks	For correctly finding the smallest value of 83
1 mark	For correctly finding the IQR
0 marks	Multiple errors in working out or no relevant working out.

Markers Feedback This question was poorly done as students did not use x to find the IQR. Those that did need to read the reference sheet carefully as it states
.

An outlier is a score

less than $Q_1 - 1.5 \times IQR$

or

more than $Q_3 + 1.5 \times IQR$

18	The graph below shows the depreciation of a laptop over time.

Laptop Value vs Age
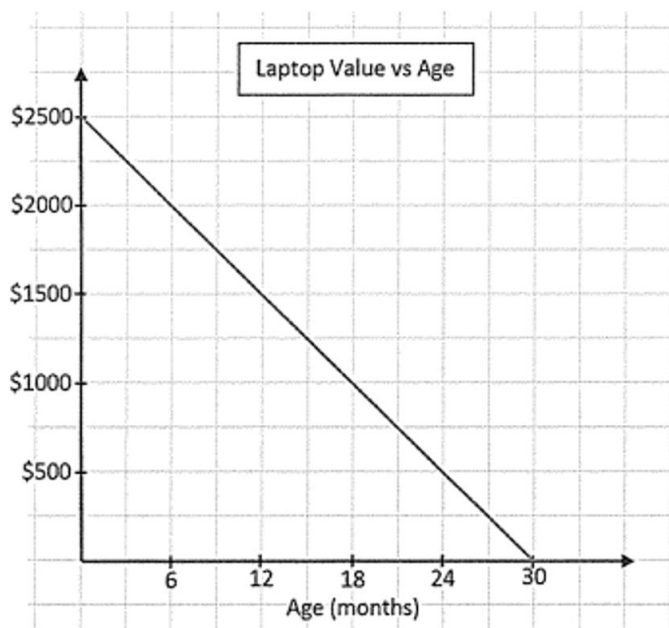
What is the gradient of the line and what does it represent?

Solution

$$m = \frac{rise}{run}$$

$$m = \frac{(0 - 2500)}{(30 - 0)}$$

$$m = -\frac{2500}{30}$$

$$m = -\frac{250}{3}$$

The gradient represents the decrease of the value of the laptop per month.

Marking Guideline

2 marks	For correctly finding the rate of decrease of $83.33/month
1 mark	For correctly finding the gradient of $-\frac{250}{3}$ or -83.33
0 marks	Multiple errors in working out or no relevant working out.

Markers Feedback Many students did not recognize the negative gradient or what it represented.

19	A patient requires 2400 mL of fluid to be delivered at a constant rate by means of a drip over 12 hours. Each mL of fluid is equivalent to 15 drops.

How many drops per minute need to be delivered?

Solution

$$12 \ hours = 12 \times 60 \ minutes$$
$$= 720 \ minutes$$
$$2400 \ mL = 2400 \times 15 \ drops$$
$$= 36000 \ drops$$
$$rate = \frac{36000 \ drops}{720 \ minutes}$$
$$= 50 \ drops \ per \ minute$$

Marking Guideline

2 marks	For correctly finding 50 drops per minute.
1 mark	For making some progress.
0 marks	Multiple errors in working out or no relevant working out.

Markers Feedback This question was well done.

20	(a) The probability that Arabella will score more than 100 points in a game of bowling is $\frac{21}{30}$.

Isabella states that the probability that Arabella will score less than 100 points in a game of

bowling is $\frac{9}{30}$.

Is Isabella correct? Give a reason for your answer.

Solution
The probability that she scores exactly 100 points has not been considered, thus she is wrong.

Marking Guideline

1 mark	Correct Solution.
0 marks	Incorrect Solution.

Markers Feedback Some students did not consider scoring exactly 100 points

(b) Arabella plays two games of bowling. What is the probability that she scores more than 100 points in the first game and then again in the second game?

Solution

$$P(\text{scores } 100 \cap \text{scores } 100) = \frac{21}{30} \times \frac{21}{30}$$

$$= \frac{49}{100} = 49\%$$

Marking Guideline

1 mark	Correct Solution.
0 marks	Incorrect Solution.

Markers Feedback This question was well done.

21	Five boxes with varying weight are arranged from lightest to heaviest, left to right.

Box 1   Box 2   Box 3   Box 4   Box 5
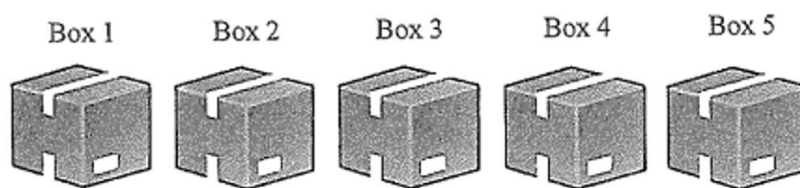
The following data is given about the boxes.

Mode: 0.6 kg   Mean: 1.2 kg   Median: 0.9 kg   Range: 1.5 kg

Write above each box its weight.

Solution
Box 3 = 0.9 kg as it is the median box (the middle box)
Box 1 and Box 2 = 0.6 kg as they must appear at least twice to be the mode and are both below the median.
Box 5 = 2.1 kg as the range is 1.5 kg and we know that Box 1 is 0.6 kg. So $2.1 - 0.6 = 1.5$ for range.
For Box 4: the mean is 1.2 kg so,

$$\frac{0.6 + 0.6 + 0.9 + x + 2.1}{5} = 1.2$$

$$\frac{x + 4.2}{5} = 1.2$$

$$x + 4.2 = 6$$

$$x = 1.8$$

Thus Box 4 is 1.8 kg.

Marking Guideline

2 marks	For correct answers.
1 mark	For one error.
0 marks	More than one error.

Markers Comments This question was well done.

22

Question 22 (3 marks)

The capture-recapture technique was used to estimate a population of koalas in a national park in 2023.

- 48 koalas were caught, tagged and released.

- Later, 45 koalas were caught at random.

- 9 of these 45 koalas had been tagged.

The estimated population of koalas in 2023 was 20% less than the estimated population for 2016. What was the estimated population for 2016?

Solution

$$\frac{48}{x} = \frac{9}{45}$$

$$\frac{x}{48} = \frac{45}{9}$$

$$x = \frac{45}{9} \times 48$$

$$x = 240$$

There are approximately 240 koalas in 2023.

For 2016;

$$80\% = 240$$

$$1\% = 3$$

$$100\% = 300$$

So in 2016, the koala population would have been approximately 300.

Marking Guidelines

3 marks	3 for correct solution.
2 marks	2 for finding the population in 2023.
1 mark	1 for some correct working.
0 marks	Multiple errors in working out or no relevant working out.

Markers Comments Many students found the population in 2023 but did not use the unitary method to find the population in 2016

23 A shape consisting of a quadrant and a right-angled triangle is shown.

NOT TO SCALE

6 cm

10 cm
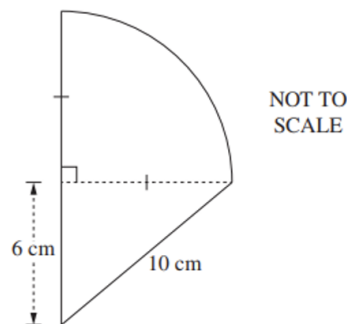
What is the perimeter of this shape, correct to one decimal place?

Solution

Finding the short side of the right-angled triangle:

$$a^2 = c^2 - b^2$$

$$= 10^2 - 6^2$$

$$a = \sqrt{10^2 - 6^2}$$

$$a = 8$$

Thus, the side radius of the quadrant is also 8 (due to the markings).

The arc length of the circular part:

$$l = \frac{\theta}{360} \times 2 \times \pi \times r$$

$$= \frac{90}{360} \times 2 \times \pi \times 8$$

$$= 12.57$$

To find the perimeter:

$$P = 10\,m + 6\,m + 8\,m + 12.57\,m$$

$$= 36.57\,m$$

Marking Guideline

3 marks	Full working out with no errors and finds correct perimeter.
2 marks	For almost all correct, only one error.
1 mark	Using Pythagoras to find the radius of the quadrant.
0 marks	Multiple errors in working out or no relevant working out.

Markers Comment This question was well done.

| 24 | Will purchased 200 BHP shares at $42.56 per share. The brokerage fee for the purchase was $9.95.

Will was paid a dividend of $1.20 per share, then immediately sells the shares for $45.31 each. The brokerage fee for the sale was $9.95.

What was Will's total profit? |

Solution

When he purchased the shares (loss):
$$200 \times \$42.56 + \$9.95 = \$8521.95$$
The dividends (gains):
$$200 \times \$1.20 = \$240$$
When he sells the shares (gains):
$$200 \times \$45.31 - \$9.95 = \$9052.05$$
Profit:
$$\$9052.05 + \$240 - \$8521.95 = \$770.10$$

Marking Guideline (2 marks)

2 marks	Full working out with no errors and finds correct profit of $770.10.
1 mark	One error in solution but otherwise equivalent solution.
0 marks	Multiple errors in working out or no relevant working out.

Markers Comment

The main issue was students did not correctly take two amounts of $9.95 from the profit as both times it was a fee or failed to add the dividend to the profit.

| 25 | Emily watches television for three hours every day. Her television uses 350 watts per hour and her electricity is charged at 37.56 cents per kWh.

How much does it cost Emily to run her television for a year? |

Solution

Watts to kilowatts:
$$350 \ watts = 0.35 \ kilowatts$$
Kilowatts tv uses in a year:
$$0.35 \ kW \times 3 \times 365 = 383.25 \ kWh$$
Cost:
$$383.25 \times \$0.3756 = \$143.95$$

Marking Guideline

2 marks	Full working out with no errors and finds correct cost
1 mark	Correctly converts watts into kilowatts but does not find the correct total cost or makes a single mistake but otherwise equivalent solution.
0 marks	Multiple errors in working out or no relevant working out.

Markers Comment

The main issues were students correctly converting 350 watts to kilowatts or forgetting to multiply the days by 3 to find out how many hours in the year the t.v. was on for.

| 26 | Clark's formula is used to determine the dosage of medicine for children. |

$$\text{Dosage} = \frac{\text{weight in kg} \times \text{adult dosage}}{70}$$

The adult daily dosage of a medicine contains 3150 mg of a particular drug. Baby Sophia who weighs 35 kg is to be given tablets each containing 525 mg of this drug. How many tablets should Sophia be given daily?

Solution

$$Dosage = \frac{35\ kg \times 3150\ mg}{70}$$

$$= 1575\ mg$$

The dosage she requires is 1575 mg.

$$Tablets = \frac{1575\ mg}{525\ mg}$$

$$= 3$$

Marking Guideline

2 marks	Full working out with no errors and finds correct number of tablets
1 mark	Finds the correct dosage but not tablets or finds tables with incorrect working for dosage.
0 marks	Multiple errors in working out or no relevant working out.

Markers Comment
Students either got this fully correct or failed to find the correct dosage.

27	

Jack is driving on the M1 at a speed of 110 km/h and has to break suddenly. He has a reaction time of two seconds and the breaking distance of 59.2 metres. Calculated his stopping distance correct to one decimal place..

Solution

Calculate reaction time distance:

$$\frac{110 \ km}{1 \ h} = \frac{110 \times 1000 \ m}{1 \times 60 \times 60 \ s}$$

$$= \frac{110000 \ m}{3600 \ s}$$

$$= 30.56 \ m/s$$

In two seconds, he travelled:

$$30.56 \ m/s \times 2 \ s = 61.12 \ m$$

Total stopping distance:

$$59.2 \ m + 61.1 \ m = 120.3 \ m$$

Marking Guideline

2 marks	Full working out with no errors and finds correct total stopping distance.
1 mark	Correctly converts km/h to m/s but no further working out or wrong total stopping distance.
0 marks	Multiple errors in working out or no relevant working out.

Markers Comment

Students struggled to find the correct conversion to m/s and then failed to multiply it by 2 for the 2 seconds. Students also failed to find the total stopping distance by failing to add the reaction distance with the breaking distance.
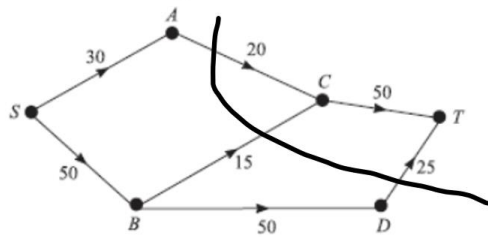
28

The network diagram below flows from the source (S) to sink (T).

The minimum cut is 60 as shown. Re-label the entire network diagram, by changing the weight of exactly two of the edges to increase the maximum flow to 80. Circle the two changes you have made.
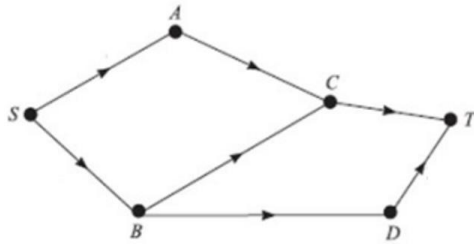
Solution

Increase $A \rightarrow C$ by 10 and increase $D \rightarrow T$ by 10.

Marking Guideline

2 marks	Full working out with no errors and adjusts the correct edges.
1 mark	Changes values on the minimum cut but not done correctly.
0 marks	Multiple errors in working out or no relevant working out.

Markers Comment

Most students identified that changes were needed along the minimum cut but choosing the correct changes was not done as well.

29	Jack, the greatest butcher on the Central Coast, earns a yearly salary of $63752. His annual leave loading is $17\frac{1}{2}\%$ of four weeks' pay.

Calculate his total pay for his four weeks of annual leave.

Solution
One weeks pay:
$$\frac{\$\,63752}{52} = \$\,1226$$
Four weeks pay:
$$\$\,1226 \times 4 = \$\,4904$$
Holiday loading:
$$\$\,4904 \times 17.5\% = \$\,858.2$$
Total pay over the four weeks:
$$\$\,4904 + \$\,858.20 = \$\,5762.20$$

Marking Guideline

3 marks	Full working out with no errors and finds correct total pay
2 marks	Correctly finds four weeks pay and holiday loading but does not sum the amount, or finds incorrect four weeks pay but finds correct holiday loading and sums it to the total.
1 mark	Finds four week loading or holiday loading but not both.
0 marks	Multiple errors in working out or no relevant working out.

Markers Comment
Most students correctly found the 4 weeks payment and found the $17\frac{1}{2}\%$ holiday loading but failed to find total by summing the two payments.

| 30 | Approximately 71% of Earth's surface is covered by water. Assume Earth is a sphere with radius 6400 km. |
| | Calculate the number of square kilometres covered by water. Give your answer in scientific notation, correct to one decimal place. |

Solution

$$Area_{surface} = 4\pi r^2$$
$$= 4 \times \pi \times 6400^2$$
$$= 514718540.3$$

Calculating water's surface and converting into scientific notation correct to 1 d.p:

$$71\% \times 514718540.3 = 365450163.7$$
$$= 3.7 \times 10^8$$

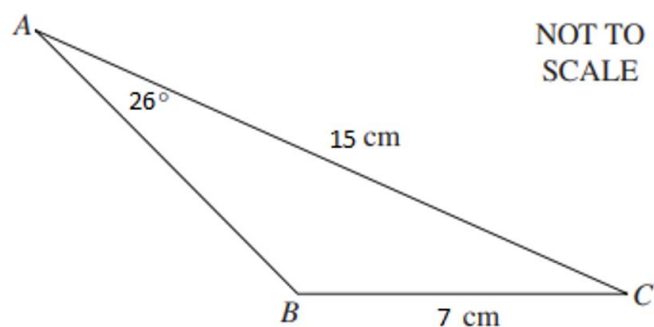**Marking Guideline**

3 marks	Full working out with no errors and finds correct surface area of the water rounded correctly.
2 marks	Finds correct answer but does not round to correct significant figures, or has one error in solutions and rounds the significant figures correctly, or only finds total surface area but rounds correctly.
1 mark	Finds total surface area but does not correctly find the water or simplify correctly, or incorrectly finds a total surface area but rounds the significant figures correctly.
0 marks	Multiple errors in working out or no relevant working out.

Markers Comment

Most students found the total surface area but some failed to find 71% for the water.

31 Find the size of the obtuse angle _ABC_, correct to the nearest degree.

A

26°

15 cm

NOT TO SCALE

B   7 cm   C

Solution

$$\frac{\sin(ABC)}{15} = \frac{\sin(26°)}{7}$$

$$\sin(ABC) = \frac{\sin(26°)}{7} \times 15$$

$$ABC = \sin^{-1}\left(\frac{\sin(26°)}{7} \times 15\right)$$

$$ABC = 70°$$

To find the obtuse angle:

$$180° - 70° = 110°$$

Marking Guideline

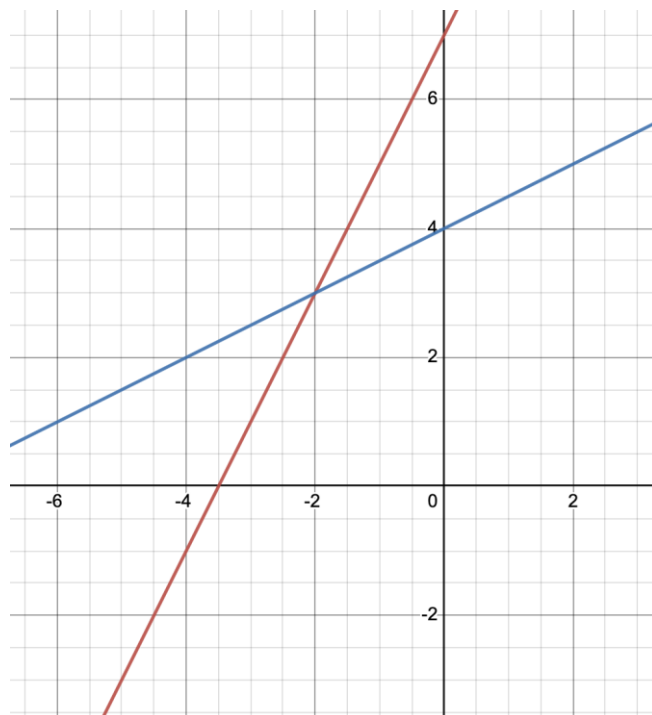| 3 marks	Full working out with no errors and finds correct **obtuse** angle.
2 marks	Correctly finds the acute angle or one error in solution that would otherwise lead to correct obtuse angle.
1 mark	Correctly writes an expression for ABC but no further correct working or at most two errors in solution but otherwise correct answer.
0 marks	Multiple errors in working out or no relevant working out.

Marker Comment

Most students could find the acute angle but either did not attempt to find the obtuse angle or did not know how to.

32

Graph the following pair of equations and identify the coordinates of the point of intersection of the two lines.

$$y = 2x + 7 \qquad\qquad x - 2y + 8 = 0$$

Solution

Point of intersection is $(-2, 3)$

Marking Guideline

|	
3 marks	Full working out with no errors and has labelled at least one of the linear relationships.
2 marks	Correct answer but does not label either line, or one equation is wrong but has correct solution for working given.
1 mark	Correctly has one linear relationship but does not have second and does not have a solution to the equations.
0 marks	Multiple errors in working out or no relevant working out.

Marker Comment

Most marks were lost for not correctly labelling the linear relationships, if one was labelled but not the other then full marks were awarded.

33

Part of the floor plan of a house is shown. The plan is drawn to scale.
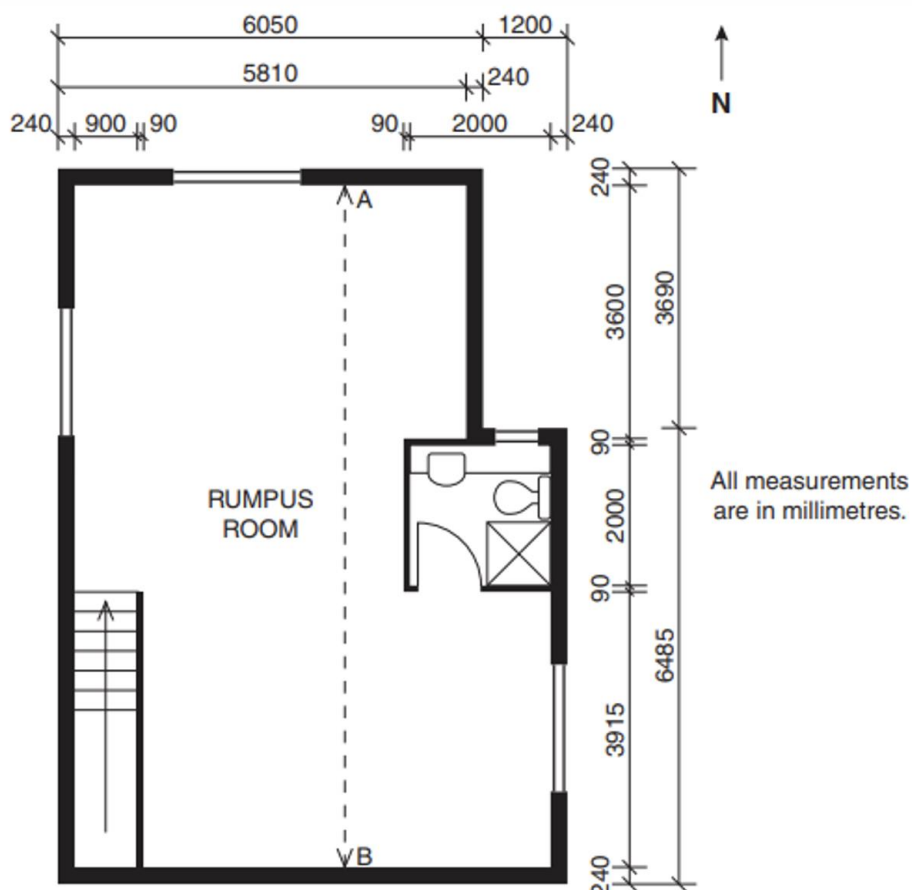
(a) Use the plan, the to find the dimensions of the bathroom, in millimetres?

Solution
$$2000\ mm\ \times\ 2000\ mm$$

Marking Criteria

1 mark	Correct Solution
0 marks	Incorrect Solution

Marker Comment
Some students included the wall or tried to take the wall out of dimensions. Some students tried to find the area when the question was just asking for dimensions.

(b) Use the plan to find the length of AB, the internal length of the rumpus room, in millimetres

Solution
$$AB = 3600 + 90 + 2000 + 90 + 3915$$
$$= 9695$$

Marking Criteria

1 mark	Correct Solution
0 marks	Incorrect Solution

Marker Comment
Some students included the wall when the internal length was asked for or didn't add the extra 90's to the solution.

(c) Calculate the scale of the plan. There are three identical windows to be purchased for this rumpus room. Use the scale of the plan to find the width of the windows to be purchased. Give your answer in millimetres.

Solution

The scale is 1:100, the measurement on the scale has the width of the window between 1.5 mm and 2.0 mm (approximately 1.7 mm), thus the actual width of the window would be between 150 mm and 200 mm.

Marking Criteria

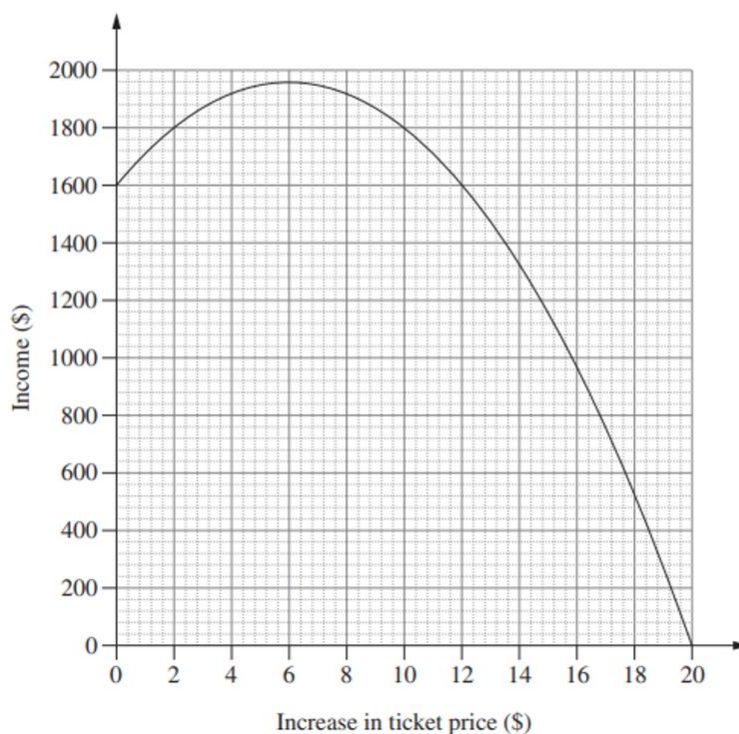| 2 marks	Correct solution.
1 mark	Correct scale but not correct width.
0 marks	Multiple errors in working out or no relevant working out.

Markers Comment

Some students didn't measure the width or used the length of the window.

| 34 | A movie theatre has 200 seats. Each ticket currently costs \$8.

The theatre owners are currently selling all 200 tickets for each session. They decide to increase the price of tickets to see if they can increase the income earned from each movie session.

It is assumed that for each one dollar increase in ticket price, there will be 10 fewer tickets sold.

A graph showing the relationship between an increase in ticket price and the income is shown below.

(a) What ticket price should be charged to maximise the income from a movie session? |

Solution
$$\$6 + \$8 = \$14$$

Marking Criteria

1 mark	Correct Solution
0 marks	Incorrect Solution

Markers Comment
A few students did not add the initial \$8 as it was a \$6 *increase*.

(b) What is the number of tickets sold when the income is maximised?

Solution
$$200 - (10 \times 6) = 140$$

Marking Criteria

1 mark	Correct Solution
0 marks	Incorrect Solution

Markers Comment
Issues reading the correct value from the graph to get correct answer or not applying formula properly.

(c) The cost to the theatre owners of running each session is $500 plus $2 per ticket sold. Calculate the profit earned by the theatre owners when the income earned from a session is maximised.

Solution

$$Cost = \$\,500 + \$\,2 \times 140$$
$$= \$\,780$$
$$Income = \$\,1960$$
$$Prof\,it = \$\,1960 - \$\,780$$
$$= \$\,1180$$

Marking Criteria

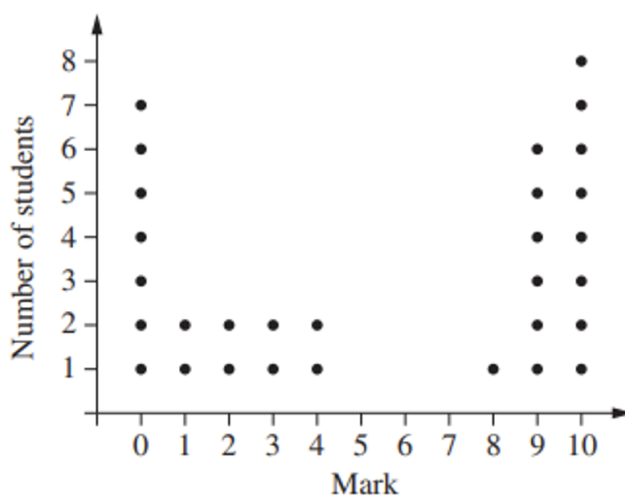| 2 marks	Correct solution.
1 mark	Finds either correct cost or wrong profit or incorrect cost but correct profit.
0 marks	Multiple errors in working out or no relevant working out.

Markers Comment

Some students used the wrong income or failed to find the correct cost.

35

All the students in a class of 30 did a test.

The marks, out of 10, are shown in the dot plot.

(a) Find the standard deviation, correct to two decimal places.

Solution

$$\sigma_x = 4.22$$

Since it is the population of a class of 30 we use the population standard deviation.

Marking Criteria

1 mark	Correct Solution
0 marks	Incorrect Solution

Markers Comment

N/A

(b) The mean test mark is 5.4. Using the dot plot, calculate the percentage of the marks which lie within one standard deviation of the mean.

Solution

$$1 \ standard \ deviation = 5.4 \pm 4.22$$

$$= 1.18, \ 9.62$$

$$percentage = \frac{13}{30} \times 100$$

$$= 43.3\%$$

Marking Criteria

1 mark	Correct Solution
0 marks	Incorrect Solution

Markers Comment
Some students did not include that correct values to find the percentage or lacked the working out to be able to have been given a carry-over error.

(c) Amanda states that for any data set, 68% of the scores should lie within one standard deviation of the mean. With reference to the dot plot, explain why the Amanda's statement is NOT relevant in this context.

Solution
The statement is not relevant as this fact is only true for a normally distributed set of data, which this data set is not.

Marking Criteria

1 mark	Mentions that the data set was not normally distributed
0 marks	Incorrect Solution

Markers Comment
A description of the data set itself was not a reasonable explanation. The explanation must mention that it was **not** normally distributed.

	Test 1	Test 2
Mean (μ)	60	58
Standard Deviation (σ)	6.2	6

36 The results of two class tests are normally distributed. The means and standard deviations of the tests are displayed in the table.

(a) Zara scored 63 in Test 1 and 62 in Test 2. She states he has performed better in Test 1 than Test 2 relative to the class. Justify whether you agree or disagree with her statement with appropriate calculations.

Solution

$$z_1 = \frac{63 - 60}{6.2}$$

$$= 0.4837$$

$$z_2 = \frac{62 - 58}{6}$$

$$= 0.6667$$

Her z-score was greater for the second test so she did relatively better in that test. Disagree with her statement.

Marking Criteria

2 marks	Correctly finds z-scores and identifies that she is incorrect in her statement.
1 mark	Correctly finds z-score but does not correctly identify that she is incorrect or only identifies that she is incorrect but does not have relevant working out.
0 marks	Multiple errors in working out or no relevant working out (i.e. does not find the z-scores to make the comment).

Markers Comment
Some students did not find the z-score and only based their answer on what they "thought".
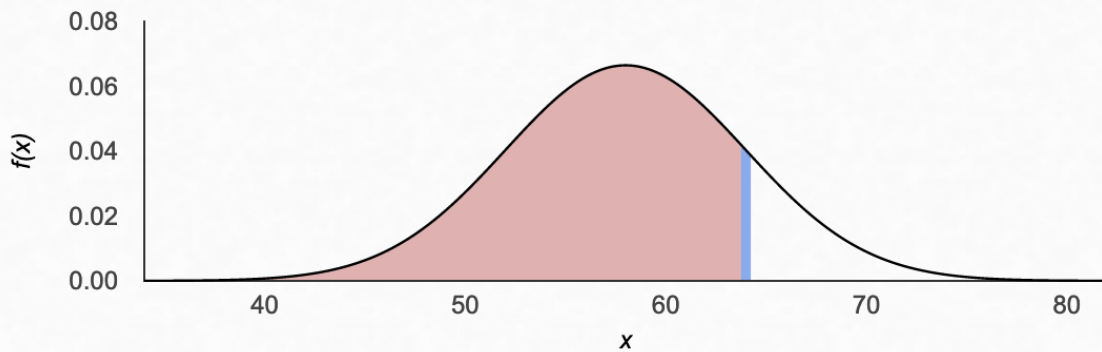
(b) If 150 students sat Test 2, how many students would you expect to have scored less than 64?

Solution

$$z = \frac{64 - 58}{6}$$

$$= 1$$

To find the percentage where $Z < 1$,

50% of the scores lie under the mean ($Z < 0$), and 34% of the scores lie between $0 < Z < 1$. Thus 84% of the scores lie below 1 z-score.

$$150 \times 84\% = 126$$
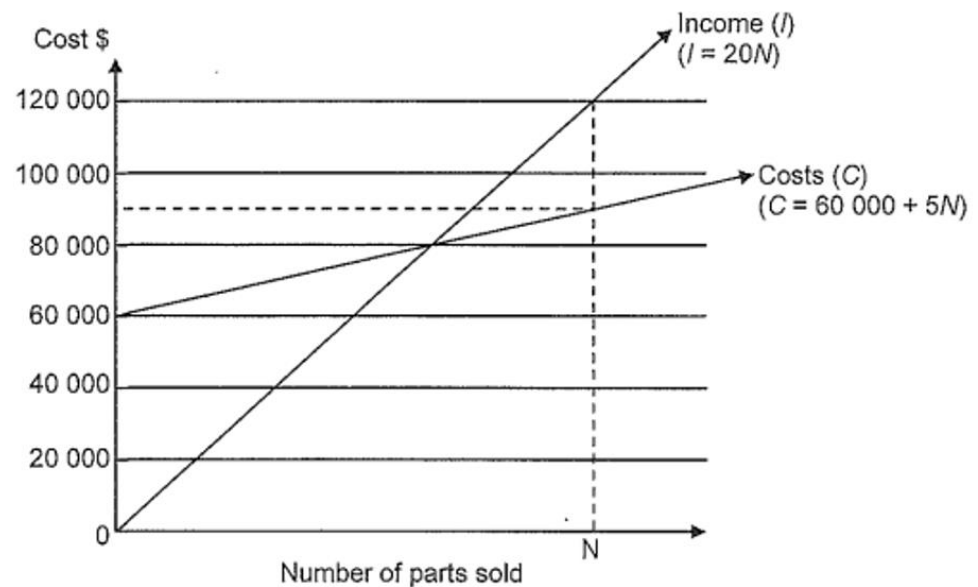
Marking Criteria

1 mark	Correct Solution
0 marks	Incorrect Solution

Markers Comment

Some students did not find 84% of the 150 students or did not correctly get to 84% by adding the 50% of scores from the left-hand side with the 34% of scores from the centre to 1 standard deviation to the right.

| 37 | A manufacturer spends $60,000 for a machine which produces a specific part for jet engines. |

The graphs and equations representing the manufacturers cost (C) and income (I) from the sale of the parts are shown on the diagram below.

(a) At the break even point, how many parts are sold?

Solution

Marking Criteria
    (1) Equating the Income and Costs equations
    (1) Correct solution

Markers Comment
Most students were able to equate the 2 equations for the break even point. Some students made the mistake of adding 5N to both sides instead of subtracting.

(b) What profit is made per part, when N parts are sold?

Solution

Marking Criteria
 (1) Calculating the profit at N
 (1) Calculating the number of parts at N
 (1) Calculating the profit per part

Markers Comment
Most students were able to calculate either the profit or number of parts at N. Some students got both calculations but were unsure of how to get per part.

| 38 | A random variable is normally distributed with a mean 0 and standard deviation 1. The probability values given in the table for different values of z are represented by the shaded area in the diagram below the table. |

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817

(a) Using the table, find P(z< 1.16)

Solution

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770

From the table:
$P(z < 1.16) = 0.8770$ or 87.7%
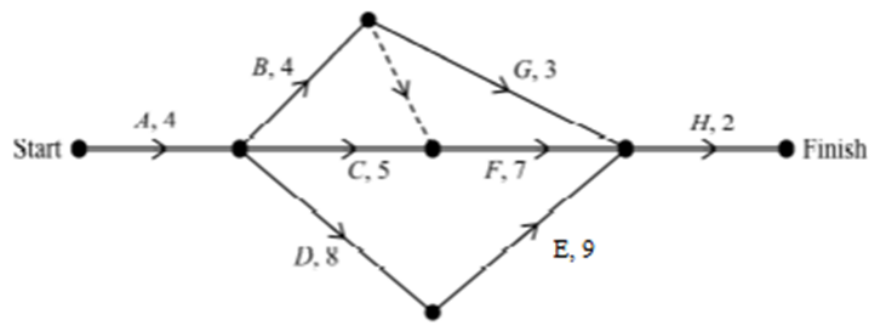
Marking Criteria
(1) Identifying the probability using the table

Markers Comment
Nearly all students were able to read the probability off of the probability table.

(b) The arm span (in metres) for a group of 10000 residents of a town are normally distributed with a mean of 1.68 metres and a standard deviation of 0.24 metres.

Alexa has an arm span of 1.4832 metres.

Calculate the z-score of Alexa's arm span.

Solution

$$z = \frac{x - \mu}{\sigma}$$
$$z = \frac{1.4832 - 1.68}{0.24}$$
$$z = -0.82$$

Marking Criteria
(1) Correct solution

Markers Comment
A strongly answered question by most students. One mistake that was seen multiple times was switching the score and the mean around which lead to a z-score of 0.82 instead of -0.82.

(c) Determine how many of the residents are expected to have an arm span less than 1.4832 metres.

Solution

Marking Criteria
(1) Obtaining 0.2061 as the probability for P(z<-0.82)
(1) Multiplying the probability by 10000 to calculate the number of residents

Markers Comment
Very few students were able to calculate P(z<-0.82). Need to revise about the symmetry of the normal distribution graph.

39 The network below shows the activities that need to occur for a project to be completed.

Complete the activity table below for the network shown.

Solution

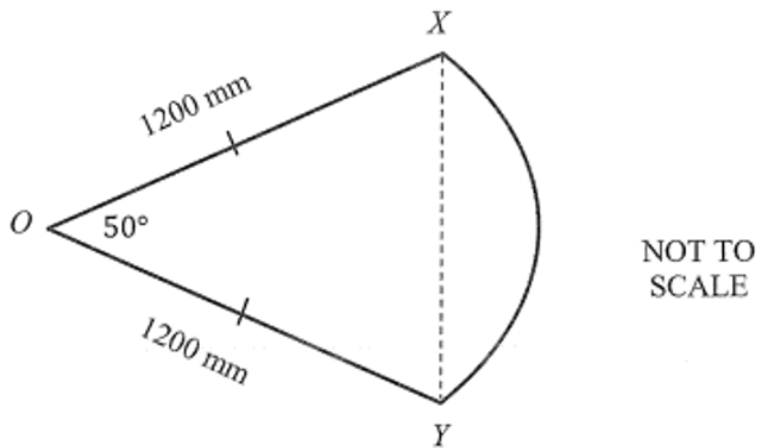| Activity	Duration	Immediate predecessor
A	4	-
B	4	A
C	5	A
D	8	A
E	9	D
F	7	B, C
G	3	B
H	2	G, F, E

Marking Criteria
   (1) Lost for each mistake

Markers Comment
One of the best answered questions on the paper. Most students acquiring 2 marks.

40	*OXY* is a sector of a circle with an angle of 50° at the centre and radius 1200 millimetres.
	How much longer, to the nearest millimetre, is the arc *XY* than the interval *XY*?

Solution

Marking Criteria
- (1) Correct formula and substitution for XY
- (1) Correct length for XY
- (1) Correct formula and substitution for Arc XY
- (1) Correct length for Arc XY
- (1) Correct solution for Arc XY > XY

Markers Comment
A well answered question from most students. Most were able to break the problem down into 2 parts and tackle each step separately before combining for the final solution. Some students need to brush up on the cosine rule.

41	A house has a roof area of 216 m^2. All the rain that falls onto this roof is diverted into a cylindrical water tank which has a <u>diameter of</u> 3.6m. During a storm, 35 mm of rain falls onto the roof. (a) Calculate the volume of water that fell onto the roof. Give your answer in m^3.
	Solution

	Marking Criteria
	  (1) Correct conversion of 35mm to m
	  (1) Correct volume of water

	Markers Comment Some mistakes in converting or neglecting to convert the 35 mm to m plagued the answers in this question.
	(b) Use your answer from part (a) to calculate the increase in the depth of water in the tank due to the rain that falls onto the roof during the storm. Give your answer to two decimal places. The volume of a cylinder is given by $V = \pi r^2 h$
	Solution

	Marking Criteria
	  (1) Correct substitution into volume formula
	  (1) Correct rearranging of the equation for h
	  (1) Correct solution to 2 d.p.

	Markers Comment A large number of students substituted the volume in from the previous part in as the height for this question to calculate a new volume. Make sure to read the question completely to understand exactly which of the unknowns you should be calculating.

42	Spencer, a football super coach, is studying the relationship between the weight in kilograms of players and their vertical jump in metres. Spencer believes that players who weigh less are able to jump higher.

The data from 10 players is shown in the table below.

weight, (w)	84.5	83.3	58.7	74.1	70.7	72.3	75.8	71.8	63.2	65.9
vertical jump (v)	21.9	20.5	20.8	19.9	20.6	18.8	22.8	20.6	20.0	21.8

(a) Find the equation of the least-squares regression line. Give each value correct to two decimal places.

Solution

$$y = 0.03x + 18.75$$
or
$$v = 0.03w + 18.75$$

Marking Criteria

　(2) Correct values for a and b in the right position

Or

　(1) Correct values for a and b in the wrong position

Markers Comment

This question was divisive. Most students either answered the whole thing correctly or left it blank. Very few errors appearing. Just take care to put the correct values into the calculator.

(b) By calculating Pearson's correlation coefficient for the data, correct to three decimal places, justify whether the data confirms the association between weight and vertical jump.

Solution

　　$r = 0.199$　(from calculator)
　　The correlation coefficient says that the data is both positive and weak.
　　Spencer's claim was that the data's correlation would be negative.
　　The correlation coefficient is not strong enough and is also positive
　　thus refuting Spencer's claim.

Marking Criteria

　(1) Correct correlation coefficient to 3 d.p.
　(1) Justification using either positive correlation or weak correlation
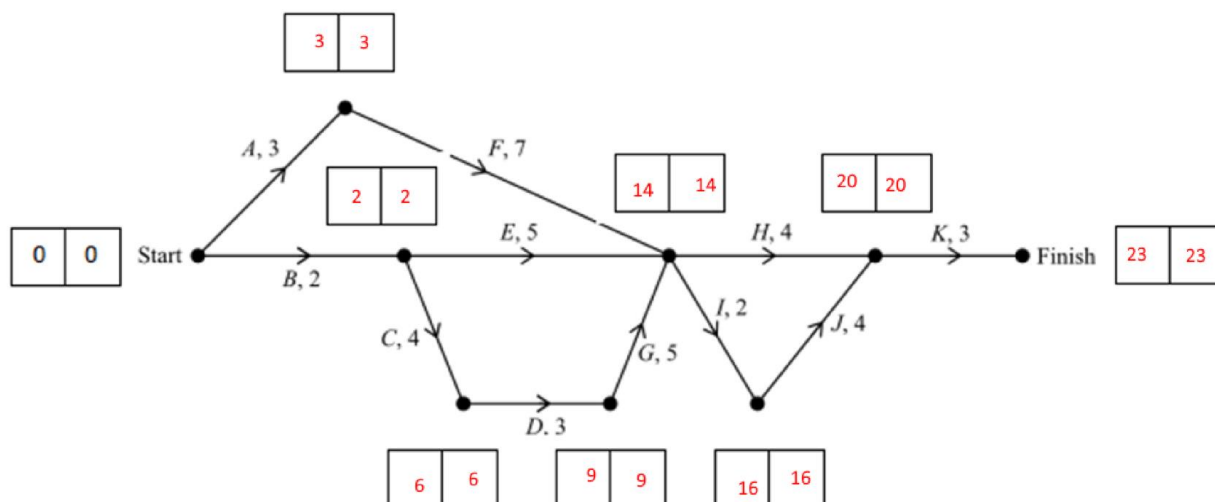
Markers Comment

Most students calculated the correct correlation coefficient and were able to identify the association as weak and thus it didn't confirm Spencer's theory. Very few students understood that Spencer was talking about a negative correlation instead of a positive correlation.

43	The network diagram shows tasks that must be completed to finish a project. Each edge weight represents the time taken to complete the task, in days.
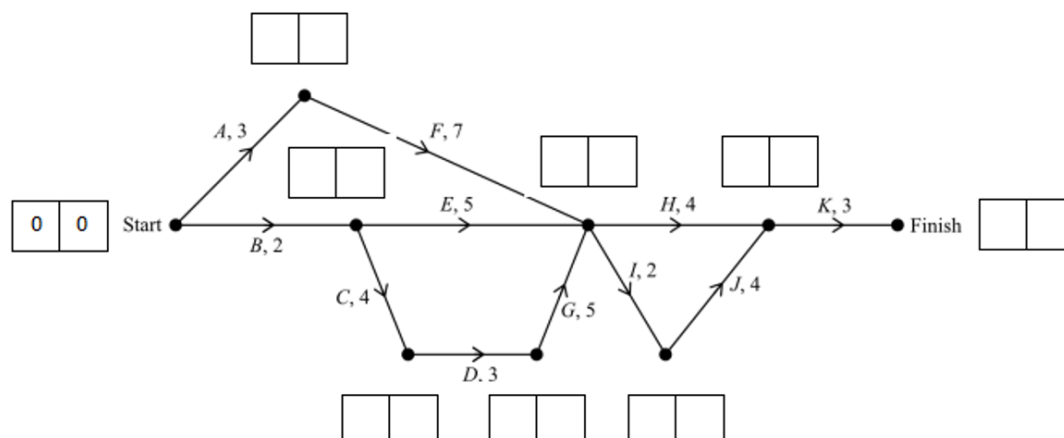
(a) Calculate, on the diagram above, the earliest starting time (EST) and latest starting time (LST) for each activity.

Solution

Marking Criteria
 (1) Lost for each error

Markers Comment
A large majority of students completed a forward and backwards scan with no issue. Some students adding the extra boxes to help find the solutions to part (c) and (d) which showed great forethought.

(b) What is minimum completion time for the project?

Solution
23 days as seen in the EST/LST for the finish.

Marking Criteria
   (1) Correct solution

Markers Comment
All students who answered (a) correctly also answered this part correctly. Some students incorrectly assumed that it was hours or minutes when the question states days. I did not mark down but you do need to read the question carefully.

	(c) What is the critical path for the project?
	Solution B-C-D-G-I-J-K
	Marking Criteria (1) Correct solution
	Markers Comment Most students were able to find the critical path. The best students at this question used a highlighter to assist.
	(d) What is the float time of activity E?
	Solution
	Marking Criteria (1) Correct solution
	Markers Comment A poorly answered part compared to the other parts in this question. You needed to check all of the other routes to E's endpoint and compare those to the time it takes to complete E. The difference gives the float time.