

Grade 12
Applied Mathematics
Achievement Test

Marking Guide

January 2014

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Websites are subject to change without notice.

Disponible en français.

Available in alternate formats upon request.

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General Marking Instructions

Please do not make any marks in the student booklets. If a student booklet is selected for sample marking, departmental staff will have to remove any marks in the booklet.

Please ensure that

- the student booklet number matches the number on the *Scoring Sheet*
- **only a pencil is used to complete the *Scoring Sheet***
- the final test mark is recorded on the *Scoring Sheet*
- the *Scoring Sheet* is complete and a copy has been made for school records

Once marking is completed, please forward the *Scoring Sheets* to Manitoba Education and Advanced Learning in the envelope provided (for more information, see the administration manual).

Marking the Questions

Explanations for common errors for multiple-choice questions have been provided, if applicable.

To receive full marks for a question, a student's response must be complete and correct. Partial marks may be awarded for an "appropriate strategy" with execution errors. **An appropriate strategy is defined as one that is consistent with the learning outcomes and mathematical processes associated with the question and, if properly executed, would lead to the correct answer.**

Some questions require a form of explanation or justification from students. Depending on the student's learning style, the explanation or justification can be given through a labelled diagram, in words, by showing mathematical operations for answer verification, or by referring to a software or calculator program. For this reason, appropriate flexibility is required when marking student responses.

Student Errors

As a guiding principle, students should only be penalized once for each error committed in the context of a test question. For example, students may choose an inappropriate strategy for a question, but carry it through correctly and arrive at an incorrect answer. In such cases, students should be penalized for having selected an inappropriate strategy for the task at hand, but should be given credit for having arrived at an answer consistent with their choice of strategy.

Communication Errors

The marks allocated to questions are primarily based on the concepts associated with the learning outcomes in the curriculum. For each question, shade in the circle on the *Scoring Sheet* that represents the mark awarded based on the concepts. A total of these marks will provide the preliminary mark.

Errors that are not related to the concepts are called “Communication Errors” and these will be indicated on the *Scoring Sheet* in a separate section (see example below). There will be a 0.5 mark deduction for each type of communication error committed, regardless of the number of errors committed for a certain type (i.e., committing a second error for any type will not further affect a student’s mark).

The total mark deduction for communication errors for any student response is not to exceed the marks given for that response. When multiple communication errors are made in a given response, any deductions are to be indicated in the order in which the errors occur in the response, without exceeding the given marks.

There is a maximum deduction of 3.5 marks for communication errors.

The student’s final mark is determined by subtracting the communication errors from the preliminary mark.

Example:

A student has a preliminary mark of 46. The student committed two E1 errors (0.5 mark deduction) and three E4 errors (0.5 mark deduction).

E1 ●
does not include one of the following in the equation: “y =”, “sin”, “ln”, or “x”, or writes parameters separately from the equation
E2 ○
does not include the units in the final answer
E3 ○
does not include one of the following on the graph: labels for the axes, units for the axes, or scales for the axes

E4 ●
does not state or incorrectly states the final answer
E5 ○
rounds too soon or rounds incorrectly
E6 ○
does not use whole units appropriately
E7 ○
makes a transcription or transposition error

Communication Errors			
Preliminary Mark	–	$\left(\begin{array}{l} 0.5 \times \# \text{ of error types for a} \\ \text{maximum deduction of 3.5 marks} \end{array} \right)$	= Final Mark
46	–	(0.5×2)	= 45

Irregularities in Provincial Tests

During the administration of provincial tests, supervising teachers may encounter irregularities. Markers may also encounter irregularities during local marking sessions. Appendix C provides examples of such irregularities as well as procedures to follow to report irregularities.

If a *Scoring Sheet* is marked with “0” and/or “NR” only (e.g., student was present but did not attempt any questions) please document this on the *Irregular Test Booklet Report*.

Assistance

If, during marking, any issue arises that cannot be resolved locally, please call Manitoba Education and Advanced Learning at the earliest opportunity to advise us of the situation and seek assistance if necessary.

You must contact the Assessment Consultant responsible for this project before making any modifications to the marking keys.

King Luu
Assessment Consultant
Grade 12 Applied Mathematics
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Toll-Free: 1-800-282-8069, ext. 4035
Email: king.luu@gov.mb.ca

Marking Keys

Please note that this *Marking Guide* contains screen captures taken from a TI-83 Plus graphing calculator.

RELATIONS AND FUNCTIONS

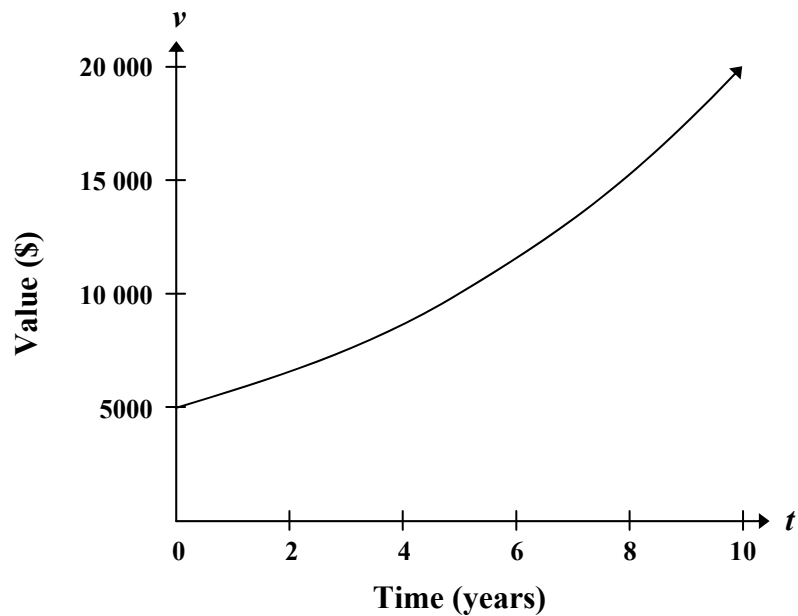
Learning Outcome: 12A.R.2

Question Type: Multiple Choice

Question 1

Total: 1 mark

Select the equation below that is best represented by the following graph.



- A) $v = 5000(0.15)^t$
- B) $v = 5000(-0.15)^t$
- ✓ C) $v = 5000(1.15)^t$
- D) $v = 5000(0.15)^{-t}$

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Question 2

Total: 3 marks

A community centre offered a new exercise program aimed at increasing lung capacity. The following data was obtained by measuring the lung capacity of a person at regular intervals during the program:

Days of Training	Lung Capacity (cm ³)
0	4 800 000
10	4 840 000
20	4 890 000
30	4 930 000
40	5 020 000
50	5 120 000
60	5 260 000

- a) Determine the cubic equation that models this data.

(1 mark)

$$y = 1.39x^3 - 23.81x^2 + 4099.21x + 4\,800\,476.19$$

- b) Explain why the domain of the function is limited in this situation.

(1 mark)

The domain is limited because the training has a finite length of time.

Other answers are possible.

- c) Explain why the range of the function is limited in this situation.

(1 mark)

The range is limited because a person's lung capacity will not increase indefinitely; the increased benefits from exercise will eventually plateau.

Other answers are possible.

Marker Note(s):

→ Regression equations may vary depending on the software used.

Marking Key	
①	1 mark for correct cubic equation in (a)
②	1 mark for appropriate limitation for the domain in (b)
③	1 mark for appropriate limitation for the range in (c)

Question 3

Total: 3 marks

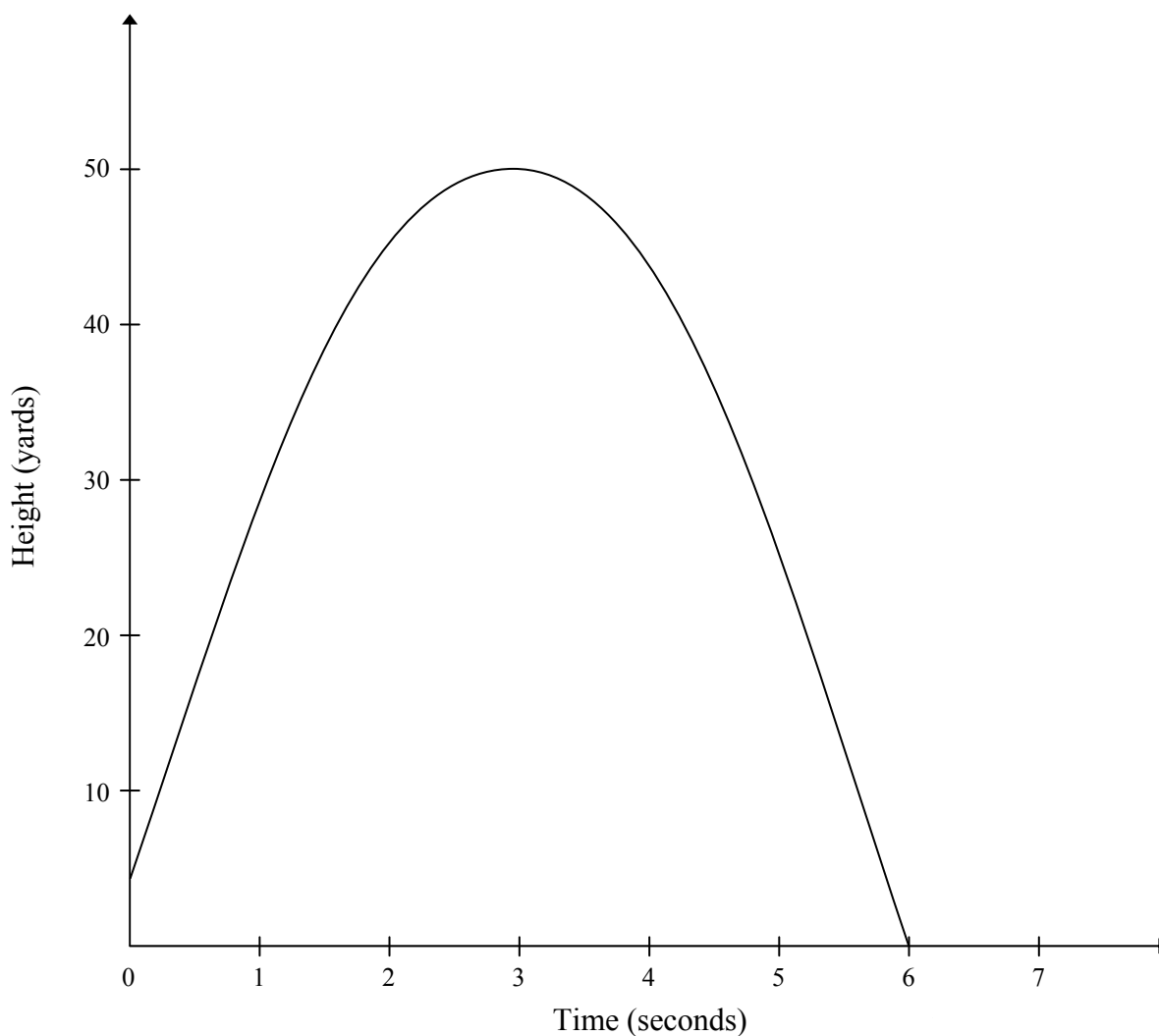
A golf ball is struck from an elevated platform at a golf course. The height of the golf ball above the ground is modelled by the equation:

$$h = -5.33t^2 + 31.33t + 4.00$$

where h represents the height (in yards) above the ground and t represents the time (in seconds) after the golf ball is struck.

a) Create a clearly labelled graph of the equation.

(2 marks)



Question 3 continued

- b) Using a graphing calculator or graphing software, determine the maximum height of the golf ball.

(1 mark)

$$x = 2.94$$

$$y = 50.04$$

The maximum height is 50.04 yards.

Marker Note(s):

→ An appropriate shape includes a scale relevant to the context of the question and key characteristics of the function (e.g., maximum, minimum, asymptotes, and intercepts).

Marking Key	
①	1 mark for correct graph with appropriate shape in (a)
②	1 mark for including: labels for the axes, units for the axes, and scales for the axes in (a)
③	1 mark for correct answer in (b)

Question 4

Total: 3 marks

The population of a city since 1996 is shown in the table below:

Population	27 500	28 000	28 500	29 600	30 700
Number of years since 1996	4	5	6	8	10

a) Determine the logarithmic equation that models this data.

(1 mark)

$$y = -551.28 + 54.32 \ln(x)$$

b) Using your equation in (a), predict the population of the city in 2016. Show your work.

(2 marks)

$$Y_2 = 20$$

$$\boxed{2\text{nd}} \boxed{\text{TRACE}} 5: \text{intersect } x = 36\,904.51, y = 20$$

The population of the city will be 36 904.

Marker Note(s):

→ Regression equations may vary depending on the software used.

Marking Key	
①	1 mark for correct logarithmic equation in (a)
②	1 mark for appropriate work in (b)
③	1 mark for correct answer in (b)

Question 5

Total: 4 marks

The London Eye is a giant Ferris wheel in London, England. It has a maximum height of 135 m, a minimum height of 0 m, and one complete rotation takes 30 min. The passengers get on the ride at the bottom of the wheel.

- a) Determine a sinusoidal equation that models this data. Explain how you arrived at your answer. Indicate the input values if you use a technology tool.

(2 marks)

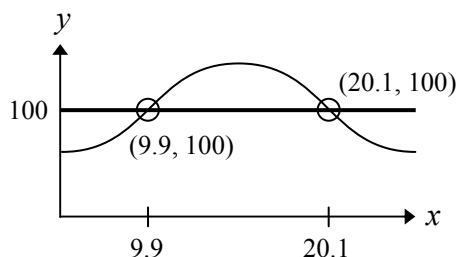
time (min)	0	7.50	15	22.50	30
height (m)	0	67.50	135	67.50	0

Using the SinReg command:

$$y = 67.50 \sin(0.21x - 1.57) + 67.50$$

- b) How many minutes would a passenger be at least 100 m above the ground during one complete rotation? Show your work.

(2 marks)



`2nd` `TRACE` 5: intersect (9.9, 100); (20.1, 100)

$$\begin{aligned} \text{time} &= 20.10 - 9.90 \\ &= 10.20 \text{ min} \end{aligned}$$

Marker Note(s):

- Regression equations may vary depending on the software used.
- Mark 1 may be awarded if the student indicates correct input values or manually calculates correctly 3 out of the 4 parameters.

Marking Key	
1	1 mark for appropriate work in (a)
2	1 mark for correct sinusoidal equation in (a)
3	1 mark for appropriate work in (b)
4	1 mark for correct answer in (b)

PROBABILITY

Learning Outcomes: 12A.P.4, 12A.P.5

Question Type: Multiple Choice

Question 6

Total: 1 mark

Assuming that repetition is allowed, how many different four-digit codes can be created using the digits 0, 1, 2, 3, 4, 5, and 6? Select the correct answer.

- A) 28
- B) 720
- C) 840
- ✓ D) 2401

Common Errors

A: 4×7

B: $6 \times 6 \times 5 \times 4$

C: $7 \times 6 \times 5 \times 4$

Learning Outcome: 12A.P.4

Question Type: Short Answer

Question 7

Total: 1 mark

A national survey found that 83% of students like pizza. If three students are selected at random, what is the probability that all three students like pizza?

$$\begin{aligned} P(3 \text{ students}) &= P(\text{student 1}) \times P(\text{student 2}) \times P(\text{student 3}) \\ &= 0.83 \times 0.83 \times 0.83 \\ &= 0.57 \text{ or } 57.18\% \end{aligned}$$

There is a 57.18% probability that all three students like pizza.

Marking Key

1

1 mark for correct answer

Question 8**Total: 2 marks**

There are 16 ducks on a pond and 7 of these ducks are female.

a) Determine the probability of randomly selecting a female duck.

(1 mark)

$$P(\text{female duck}) = \frac{7}{16} \text{ or } 0.44 \text{ or } 43.75\%$$

b) Determine the odds against selecting a female duck.

(1 mark)

The odds against selecting a female duck are 9 : 7.

Marking Key

- | | |
|---|--|
| ① | <i>1 mark for correct probability in (a)</i> |
| ② | <i>1 mark for correct ratio in (b)</i> |

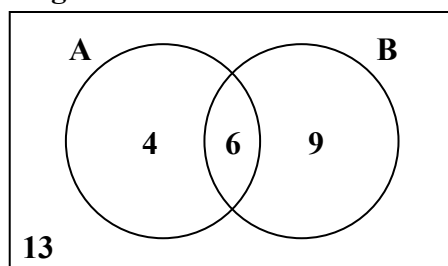
Question 9

Total: 2 marks

The following Venn diagram shows the enrolment of students in two extracurricular activities.

A: student council

B: golf



- a) Are these two activities mutually exclusive? Explain your reasoning.

(1 mark)

These activities are not mutually exclusive since 6 students are involved in both activities.

- b) Determine the probability that a student selected at random will not participate in either activity.

(1 mark)

$$P(\text{will not participate in either activity}) = \frac{13}{32} \text{ or } 0.41 \text{ or } 40.63\%$$

Marking Key	
❶	1 mark for appropriate explanation in (a)
❷	1 mark for correct answer in (b)

Question 10**Total: 2 marks**

Laurel has a bag containing 5 blue marbles, 3 green marbles, and 2 red marbles.

Using the information above, create a scenario with 2 events that are dependent. Explain why they are dependent.

Event A: selecting a blue marble

Event B: selecting a green marble with no replacement of the blue

These events are dependent because not replacing the first marble changes the probability of selecting the second marble.

Other answers are possible.

Marking Key**①***1 mark for correct example***②***1 mark for appropriate explanation*

Question 11

Total: 2 marks

An art gallery wants to display some photographs in a row on a wall. There are 2 different colour photographs and 2 different black-and-white photographs.

Using all 4 photographs, how many different arrangements are possible if the colour photographs and black-and-white photographs must alternate? Show your work.

C = colour

B = black-and-white

$\boxed{C} \boxed{B} \boxed{C} \boxed{B}$ $\boxed{B} \boxed{C} \boxed{B} \boxed{C}$

$$(2 \times 2 \times 1 \times 1) + (2 \times 2 \times 1 \times 1)$$

$$= 4 + 4$$

$$= 8 \text{ arrangements}$$

OR

$${}_2P_2 \times {}_2P_2 \times 2!$$

$$= 2 \times 2 \times 2$$

$$= 8 \text{ arrangements}$$

Marking Key	
❶	<i>1 mark for appropriate work</i>
❷	<i>1 mark for correct answer</i>

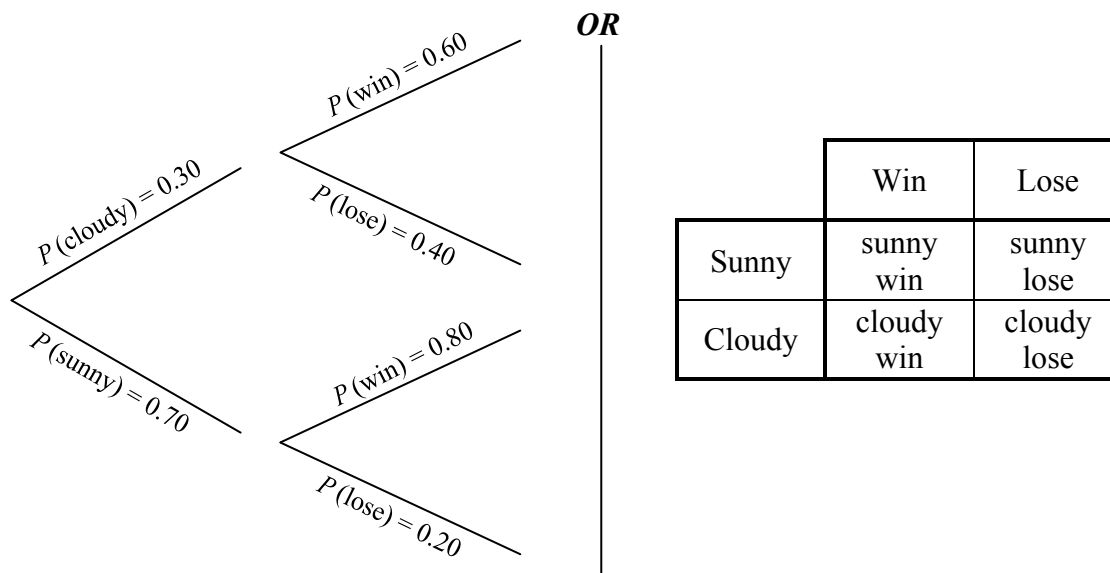
Question 12

Total: 3 marks

Based on the team's record, a local soccer team has a probability of 0.80 of winning their game on a sunny day. The probability of winning their game on a cloudy day is 0.60. The probability of cloudy weather on a given day is 0.30.

- a) Use a graphic organizer to show all the possible outcomes for this situation. (A graphic organizer is a visual representation of information. Examples include a tree diagram, a chart, a list, a Venn diagram, a truth table, Pascal's triangle, etc.)

(1 mark)



Other answers are possible.

- b) Determine the probability that the soccer team wins. Show your work.

(2 marks)

$$\begin{aligned}
 P(\text{win}) &= (0.30)(0.60) + (0.70)(0.80) \\
 &= 0.74 \text{ or } 74\%
 \end{aligned}$$

Marking Key	
❶	1 mark for correct graphic organizer showing all the possible outcomes in (a)
❷	1 mark for appropriate work in (b)
❸	1 mark for correct answer in (b)

Question 13

Total: 3 marks

A school principal is selecting students from a group of volunteers to organize a social event. There are 12 students in the group: 8 students from Class A and 4 students from Class B.

- a) How many different groups of 5 students can be created if there are no restrictions?

(1 mark)

$${}_{12}C_5 = 792$$

- b) How many different groups of 5 students are possible which include at least 1 student from Class B? Show your work.

(2 marks)

$$\begin{aligned} \text{at least 1 student from Class B} &= \text{total} - \text{no students from Class B} \\ &= 792 - ({}_4C_0 \times {}_8C_5) \\ &= 792 - 56 \\ &= 736 \end{aligned}$$

OR

$$\begin{aligned} \text{1 student from Class B: } &{}_4C_1 \times {}_8C_4 \\ &= 280 \end{aligned}$$

$$\begin{aligned} \text{2 students from Class B: } &{}_4C_2 \times {}_8C_3 \\ &= 336 \end{aligned}$$

$$\begin{aligned} \text{3 students from Class B: } &{}_4C_3 \times {}_8C_2 \\ &= 112 \end{aligned}$$

$$\begin{aligned} \text{4 students from Class B: } &{}_4C_4 \times {}_8C_1 \\ &= 8 \end{aligned}$$

$$280 + 336 + 112 + 8 = 736$$

Marking Key	
❶	1 mark for correct answer in (a)
❷	1 mark for appropriate work in (b)
❸	1 mark for correct answer in (b)

FINANCIAL MATHEMATICS

Learning Outcome: 12A.FM.1

Question Type: Multiple Choice

Question 14

Total: 1 mark

Genevieve wants to invest \$3000.00 for two years and has two options.

Option 1: Invest in a Canada Savings Bond at a simple interest rate of 2.20%.

Option 2: Invest in a guaranteed investment certificate (GIC) at an interest rate of 2.20%, compounded annually.

Select the statement that is true.

- A) The Canada Savings Bond will earn more interest.
- B) The GIC has a higher level of risk.
- C) Both investments will earn equal amounts of interest.
- ✓ D) The GIC will earn more interest.

Learning Outcome: 12A.FM.3

Question Type: Multiple Choice

Question 15

Total: 1 mark

According to the Rule of 72, what was the approximate annual interest rate of an investment that doubled in 12 years? Select the correct answer.

- A) 2%
- ✓ B) 6%
- C) 12%
- D) 24%

Common Errors

A: double
C: 12 years
D: 12×2

Question 16**Total: 1 mark**

Explain why someone would choose to rent instead of purchase a house.

They cannot afford the down payment.

OR _____

They do not want to be responsible for any repairs.

OR _____

They do not want to live in the same place for a long period of time.

Other answers are possible.

Marking Key	
1	<i>1 mark for appropriate reason</i>

Question 17**Total: 1 mark**

Aamina invests \$7500.00 in a guaranteed investment certificate (GIC). What is the rate of return on her investment if the GIC is worth \$7800.00 after one year?

$$\begin{aligned} \text{rate of return} &= \frac{\$7800.00 - \$7500.00}{\$7500.00} \times 100 \\ &= 4.00\% \end{aligned}$$

Marking Key	
1	<i>1 mark for correct answer</i>

Question 18**Total: 1 mark**

Seven years ago, Henri bought a house valued at \$249 500.00. Determine the current value of his house if it appreciated at an average rate of 8.00% per year.

$$\$249\,500.00 \times (1.08)^7 = \$427\,599.16$$

Marking Key

1	<i>1 mark for correct answer</i>
----------	----------------------------------

Question 19**Total: 2 marks**

You must choose between investing in the stock market or buying a 5-year guaranteed investment certificate (GIC).

a) Provide one disadvantage of investing in the stock market.

(1 mark)

There is a greater risk of losing money.

Other answers are possible.

b) Provide one disadvantage of buying the GIC.

(1 mark)

Your money is locked in for 5 years.

Other answers are possible.

Marking Key

1	<i>1 mark for correct disadvantage for the stock market in (a)</i>
2	<i>1 mark for correct disadvantage for the GIC in (b)</i>

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Question 20

Total: 4 marks

Petra and Sabine are comparing bank loans. Both plan to borrow \$65 000.00 at an interest rate of 5.00% for 3 years.

- Petra's loan will be compounded quarterly and she will make quarterly payments.
- Sabine's loan will be compounded monthly and she will make monthly payments.

Calculate the total amount paid for each loan. Show your work.

Petra

```

N=12
I%=5
PV=65000
PMT=-5866.7903...
FV=0
P/Y=4
C/Y=4
PMT: [ ] [ ] [ ] BEGIN
  
```

Sabine

```

N=36
I%=5
PV=65000
PMT=-1948.1083...
FV=0
P/Y=12
C/Y=12
PMT: [ ] [ ] [ ] BEGIN
  
```

$$\begin{aligned} \text{Total amount paid} &= 12(\$5866.79) \\ &= \$70\,401.48 \end{aligned}$$

$$\begin{aligned} \text{Total amount paid} &= 36(\$1948.11) \\ &= \$70\,131.96 \end{aligned}$$

Marker Note(s):

- A maximum of 1 error is allowed in the input values of a financial template (award the mark for appropriate work, but not the mark for correct answer).
- Answers may vary based on the financial template used.

Marking Key	
①	1 mark for appropriate work
②	1 mark for correct payment for Petra
③	1 mark for correct payment for Sabine
④	1 mark for correct total amounts paid for Petra and Sabine

Question 21**Total: 5 marks**

Luis wants a new computer. The total cost of the computer is \$2014.00 (taxes included). He wonders which would be the better option, getting a loan to purchase the computer or leasing the computer.

Option 1: Getting a loan

- interest rate of 6.25%, compounded monthly
- monthly payments for 2 years

Option 2: Leasing

- monthly payments of \$80.00 (taxes included) for 2 years
- purchase the computer at the end of the lease for \$400.00 (taxes included)

a) What would be Luis' monthly payment with Option 1? Show your work.

(2 marks)

```
N=24
I%=6.25
PV=2014
PMT=-89.488756...
FV=0
P/Y=12
C/Y=12
PMT: [ ] BEGIN
```

His monthly payment would be \$89.49.

Question 21 continued

b) Calculate the total cost for Option 1 and for Option 2.

(2 marks)

Option 1

$$\begin{aligned}\text{Total cost} &= \$89.49 \times 24 \\ &= \$2147.76\end{aligned}$$

Option 2

$$\begin{aligned}\text{Total cost} &= (\$80.00 \times 24) + \$400.00 \\ &= \$2320.00\end{aligned}$$

c) Which option should Luis choose? Explain your reasoning.

(1 mark)

Luis should choose Option 1 because the total cost is less.

OR

Luis should choose Option 2 because his monthly payments would be lower.

Other answers are possible.

Marker Note(s):

→ A maximum of 1 error in (a) is allowed in the input values of a financial template (i.e., award mark ① but not mark ②).

Marking Key	
①	1 mark for appropriate work in (a)
②	1 mark for correct answer in (a)
③	1 mark for correct total cost of Option 1 in (b)
④	1 mark for correct total cost of Option 2 in (b)
⑤	1 mark for appropriate explanation in (c)

DESIGN AND MEASUREMENT

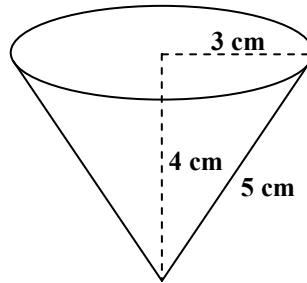
Learning Outcome: 12A.D.1

Question Type: Multiple Choice

Question 22

Total: 1 mark

What is the minimum amount of paper required to create the cone-shaped paper cup shown below? (Diagram is not drawn to scale.)



Select the correct answer.

- A) 37.70 cm^2
- ✓ B) 47.12 cm^2
- C) 75.40 cm^2
- D) 113.10 cm^2

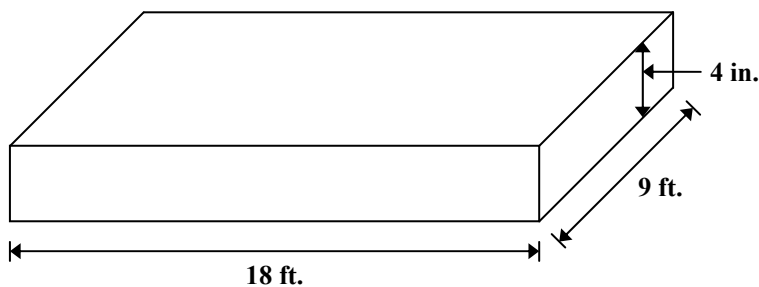
Common Errors

- A: using volume of a cone
- C: including circular end
- D: using volume of a cylinder

Question 23

Total: 2 marks

A student was given the following diagram and was asked: “How many cubic yards of soil are required to fill this garden with 4 inches of soil?” (Diagram is not drawn to scale.)



The student provided this answer : $18 \times 9 \times \frac{1}{3} = 54 \text{ ft}^3 = 18 \text{ yd}^3$

Explain the student’s error and provide the correct answer.

The student divided 54 ft^3 by 3 (3 feet = 1 yard) instead of dividing by 27 ($27 \text{ ft}^3 = 1 \text{ yd}^3$).

The correct answer is 2 yd^3 .

Marking Key

- | | |
|---|--------------------------------|
| ① | 1 mark for correct explanation |
| ② | 1 mark for correct answer |

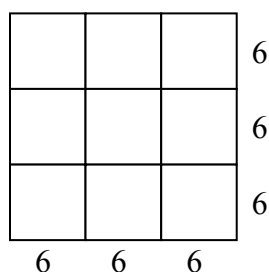
Question 24

Total: 3 marks

A bathroom floor is covered by 15 floor tiles. Each tile measures 18 in. \times 18 in.

- a) How many floor tiles measuring 6 in. \times 6 in. would be needed to cover the same area?
Show your work.

(2 marks)



nine 6 in. \times 6 in. tiles equal
one 18 in. \times 18 in. tile

$$9 \times 15 = 135 \text{ tiles}$$

OR

$$\frac{15 \times 18 \times 18}{6 \times 6} = 135 \text{ tiles}$$

- b) You would like to redo the floor with 6 in. \times 6 in. tiles. These tiles are sold in packages of 5 tiles and cost \$4.00 per package (taxes included). How much would it cost to buy the number of tiles you calculated in (a)?

(1 mark)

$$\frac{135 \text{ tiles}}{5 \text{ tiles/package}} = 27 \text{ packages}$$

$$27 \times \$4.00 = \$108.00$$

Marking Key

- | | |
|---|------------------------------------|
| ① | 1 mark for appropriate work in (a) |
| ② | 1 mark for correct answer in (a) |
| ③ | 1 mark for correct answer in (b) |

LOGICAL REASONING

Learning Outcome: 12A.L.3

Question Type: Multiple Choice

Question 25

Total: 1 mark

Given the statement: “If it is sunny outside, then I will walk to school.”

Select the converse of this statement.

- ✓ A) “If I will walk to school, then it is sunny outside.”
- B) “If it is not sunny outside, then I will not walk to school.”
- C) “If I will not walk to school, then it is not sunny outside.”
- D) “It is sunny if and only if I will walk to school.”

Common Errors

B: inverse

C: contrapositive

D: biconditional

Question 26

Total: 1 mark

Given the following universal set: $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

Give an example of two disjoint subsets of U .

$$A = \{1, 2, 3\}$$

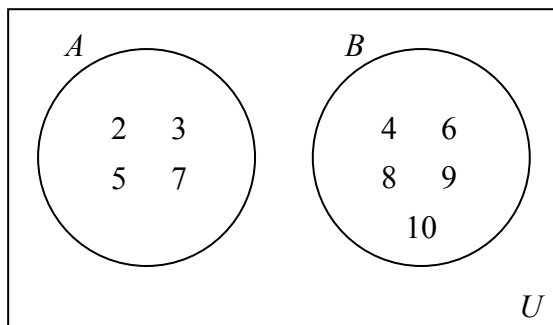
$$B = \{4, 5, 6, 7, 8, 9\}$$

OR

$$A = \{\text{even numbers of } U\}$$

$$B = \{\text{odd numbers of } U\}$$

OR



Other answers are possible.

Marking Key**1***1 mark for correct answer*

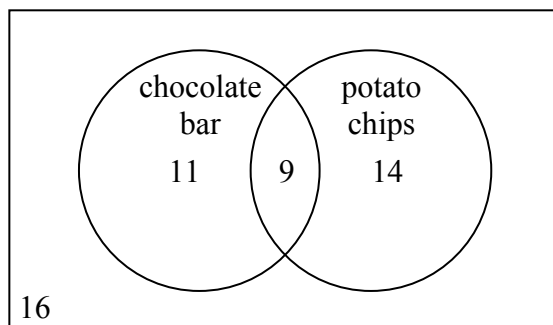
Question 27

Total: 2 marks

A survey was conducted on 50 randomly selected people to see what snacks they preferred.

Preferred Snack	Number of People
chocolate bar	20
potato chips	23
both snacks	9

How many people do not like any of the snacks indicated above? Show your work.



16 people do not like either snack.

Marking Key	
①	1 mark for appropriate work
②	1 mark for correct answer

Question 28

Total: 3 marks

Given the statement: “If a number is a multiple of 3, then it is a multiple of 9.”

a) Provide a counterexample for the given statement.

(1 mark)

6 is a multiple of 3, but it is not a multiple of 9.

Other answers are possible.

b) Write the contrapositive of the given statement.

(1 mark)

If a number is not a multiple of 9, then it is not a multiple of 3.

c) Write the inverse of the given statement.

(1 mark)

If a number is not a multiple of 3, then it is not a multiple of 9.

Marking Key	
①	1 mark for appropriate counterexample in (a)
②	1 mark for writing the contrapositive in (b)
③	1 mark for writing the inverse in (c)

Exemplars

Exemplar 1

Question 2

Total: 3 marks

A community centre offered a new exercise program aimed at increasing lung capacity. The following data was obtained by measuring the lung capacity of a person at regular intervals during the program:

Days of Training	Lung Capacity (cm ³)
0	4 800 000
10	4 840 000
20	4 890 000
30	4 930 000
40	5 020 000
50	5 120 000
60	5 260 000

a) Determine the cubic equation that models this data.

(1 mark) *Stat → edit → put values in → Stat → calc → Cubic Reg → enter*

$$y = ax^3 + bx^2 + cx + d$$

$$a = 1.39$$

$$b = -23.81$$

$$c = 4099.21$$

$$d = 4800476.19$$

$$y = 1.39x^3 - 23.81x^2 + 4099.21x + 4800476.19$$

ⓔ

b) Explain why the domain of the function is limited in this situation.

(1 mark) *The domain is limited because the program has only been on for 60 days so they can't figure out what it is until they actually use the program for the amount of days they were looking for*

c) Explain why the range of the function is limited in this situation.

(1 mark) *The range is limited because A persons lung capacity will eventually reach its peak and won't get any better*

Exemplar 1 (continued)

3 marks:

- ① → 1 mark for correct cubic equation in (a)
- ② → 1 mark for appropriate limitation for the domain in (b)
- ③ → 1 mark for appropriate limitation for the range in (c)

Ⓔ1 → 0.5 mark deduction (if applicable) for not including one of the following in the equation: “ $y =$ ”, “sin”, “ln”, or “ x ”, or for writing parameters separately from the equation

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Exemplar 2

Question 2

Total: 3 marks

A community centre offered a new exercise program aimed at increasing lung capacity. The following data was obtained by measuring the lung capacity of a person at regular intervals during the program:

Days of Training	Lung Capacity (cm ³)
0	4 800 000
10	4 840 000
20	4 890 000
30	4 930 000
40	5 020 000
50	5 120 000
60	5 260 000

a) Determine the cubic equation that models this data.

(1 mark) $y = ax^3 + bx^2 + cx + d$

$a = 1.3888$
 $b = -23.809$
 $c = 4099.206$
 $d = 4800476.19$

$y = 1.4x^3 - 24x^2 + 4099x + 4800476$
↑
(E5)

b) Explain why the domain of the function is limited in this situation.

(1 mark)

for domain x has to be a real number and greater than 0.

c) Explain why the range of the function is limited in this situation.

(1 mark)

range is limited because it has to be greater than 0 and 4 800 000

1 mark:

① → 1 mark for correct cubic equation in (a)

Ⓔ → 0.5 mark deduction (if applicable) for rounding too soon or rounding incorrectly

Exemplar 1

Question 3

Total: 3 marks

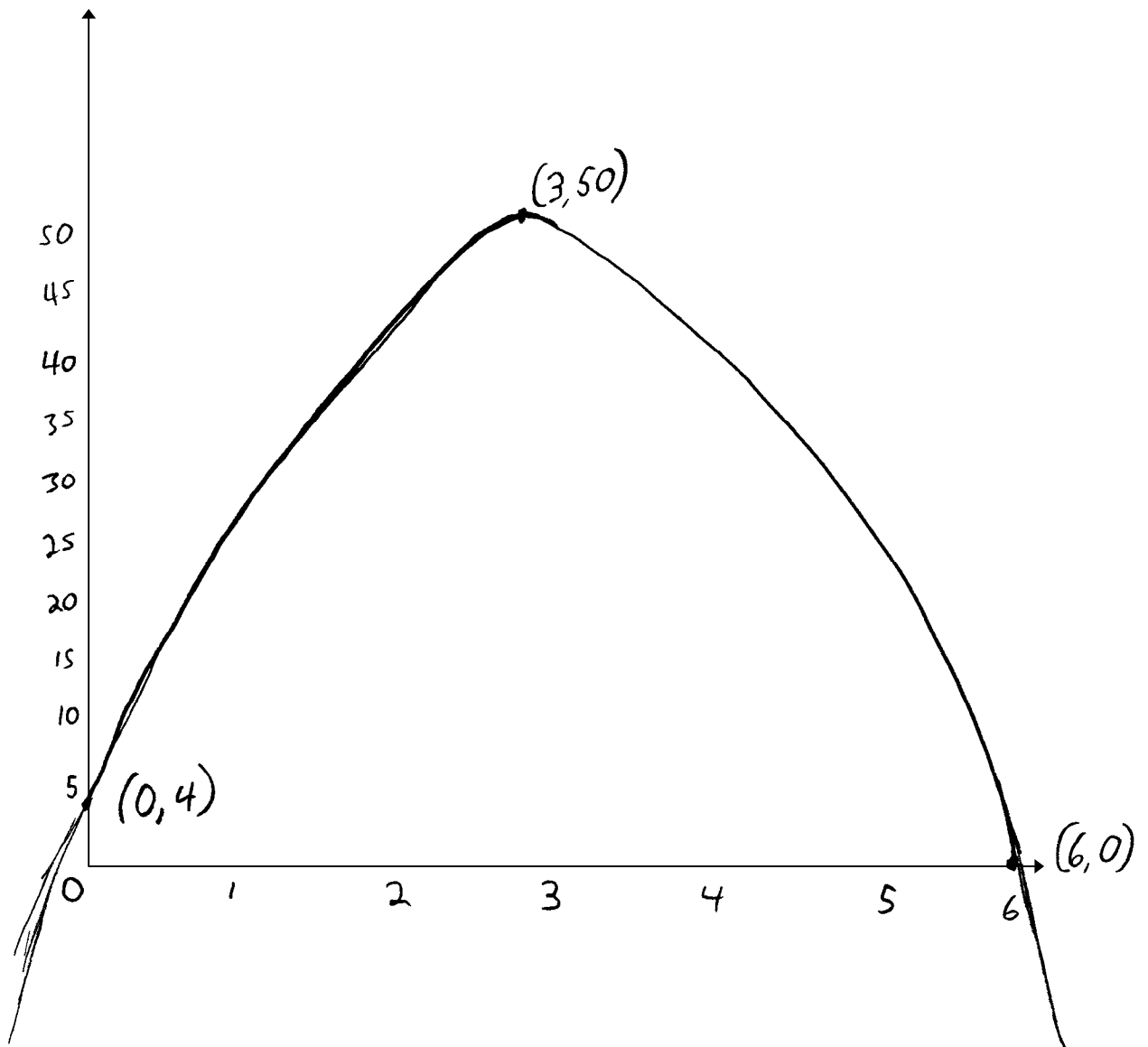
A golf ball is struck from an elevated platform at a golf course. The height of the golf ball above the ground is modelled by the equation:

$$h = -5.33t^2 + 31.33t + 4.00$$

where h represents the height (in yards) above the ground
and t represents the time (in seconds) after the golf ball is struck.

- a) Create a clearly labelled graph of the equation.

(2 marks)



Exemplar 1 (continued)

- b) Using a graphing calculator or graphing software, determine the maximum height of the golf ball.

(1 mark)

50 yards
↑
ⓔ5

2 marks:

- ① → 1 mark for correct graph with appropriate shape in (a)
- ② → 1 mark for correct answer in (b)

ⓔ5 → 0.5 mark deduction (if applicable) for rounding too soon or rounding incorrectly

Exemplar 2

Question 3

Total: 3 marks

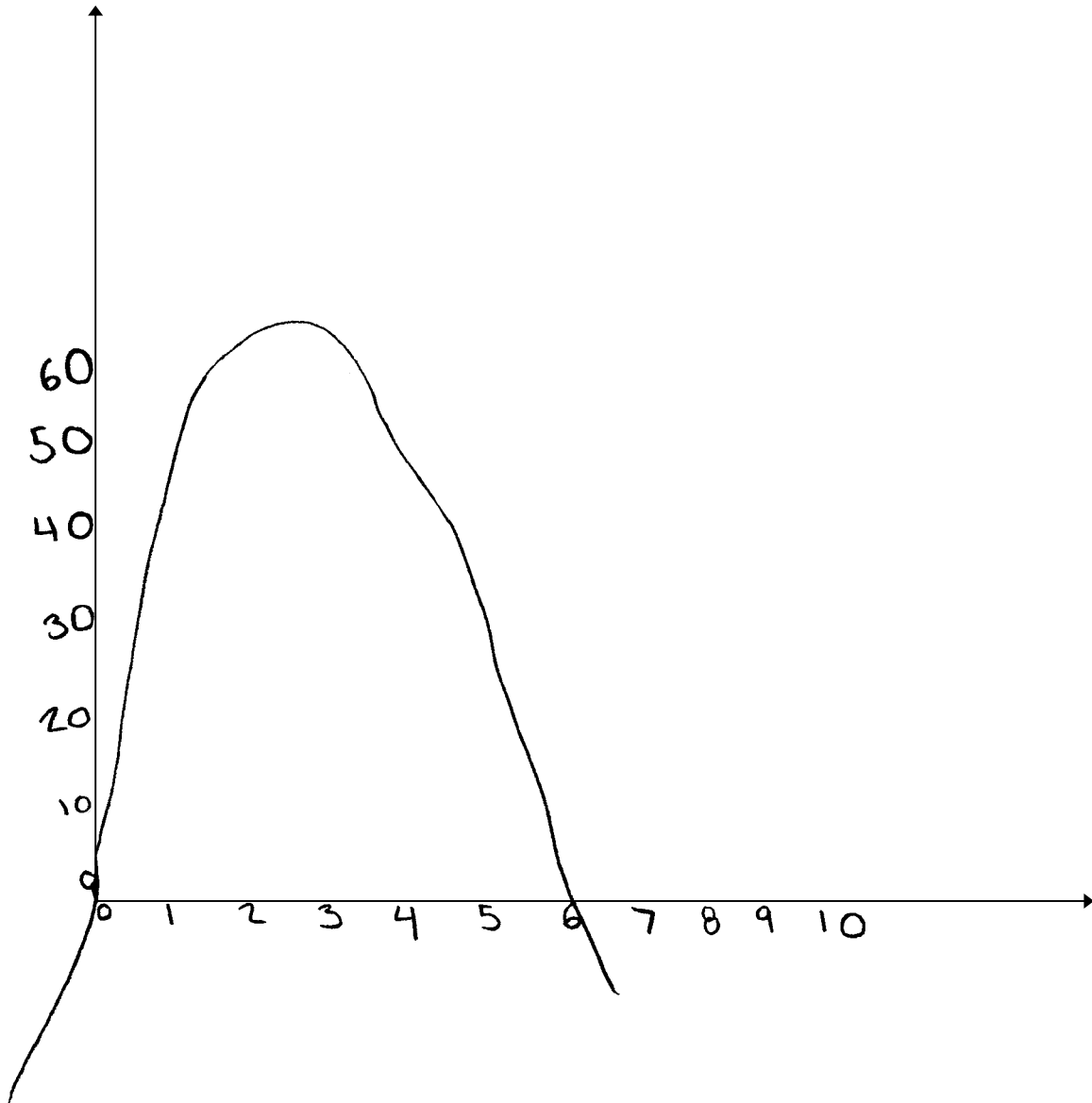
A golf ball is struck from an elevated platform at a golf course. The height of the golf ball above the ground is modelled by the equation:

$$h = -5.33t^2 + 31.33t + 4.00$$

where h represents the height (in yards) above the ground
and t represents the time (in seconds) after the golf ball is struck.

- a) Create a clearly labelled graph of the equation.

(2 marks)



Exemplar 2 (continued)

- b) Using a graphing calculator or graphing software, determine the maximum height of the golf ball.

(1 mark)

The maximum height of the
golf ball was 60 yards
at 3 seconds

1 mark:

① → 1 mark for correct graph with appropriate shape in (a)

Exemplar 1

Question 4

Total: 3 marks

The population of a city since 1996 is shown in the table below:

Population	27 500	28 000	28 500	29 600	30 700
Number of years since 1996	4	5	6	8	10

- a) Determine the logarithmic equation that models this data.

(1 mark)

$$\text{Lin Reg } L1, L2, Y1$$
$$535.34x + 25326.72$$

- b) Using your equation in (a), predict the population of the city in 2016. Show your work.

(2 marks)

Calculate value 20
(20, 36033.62)

The population would be 36033.62 in the year 2016.

2 marks:

② → 1 mark for appropriate work in (b)

③ → 1 mark for correct answer in (b)

Ⓔ → 0.5 mark deduction (if applicable) for not using whole units appropriately

Exemplar 2

Question 4

Total: 3 marks

The population of a city since 1996 is shown in the table below:

Population	27 500	28 000	28 500	29 600	30 700	(y)
Number of years since 1996	4	5	6	8	10	(x)

- a) Determine the logarithmic equation that models this data.

(1 mark)

$L_1(x)$	$L_2(y)$
4	27500
5	28000
6	28500
8	29600
10	30700

STAT, CALC, LnReg

$$y = 22450.29 + 3495.12 \ln x$$

where y represents population
and x represents the number of
years since 1996.

- b) Using your equation in (a), predict the population of the city in 2016. Show your work.

(2 marks)

$$2016 - 1996 = 20$$

$$x = 20$$

$$y = 22450.29 + 3495.12 \ln x$$

$$y = 22450.29 + 3495.12 \ln(20)$$

$$y = 32920.73$$

The population in 2016 will be 32921 people.

2 marks:

② → 1 mark for appropriate work in (b)

③ → 1 mark for correct answer in (b)

Exemplar 1

Question 5

Total: 4 marks

The London Eye is a giant Ferris wheel in London, England. It has a maximum height of 135 m, a minimum height of 0 m, and one complete rotation takes 30 min. The passengers get on the ride at the bottom of the wheel.

- a) Determine a sinusoidal equation that models this data. Explain how you arrived at your answer. Indicate the input values if you use a technology tool.

(2 marks)

$$\begin{aligned}a &= 67.5 \\ b &= \frac{\pi}{15} \\ c &= 15 \\ d &= 67.5\end{aligned}$$

$$y = 67.5 \sin\left(\frac{\pi}{15}(x-15)\right) + 67.5$$

$$\begin{aligned}d &= \frac{135+0}{2} \\ &= 67.5\end{aligned}$$

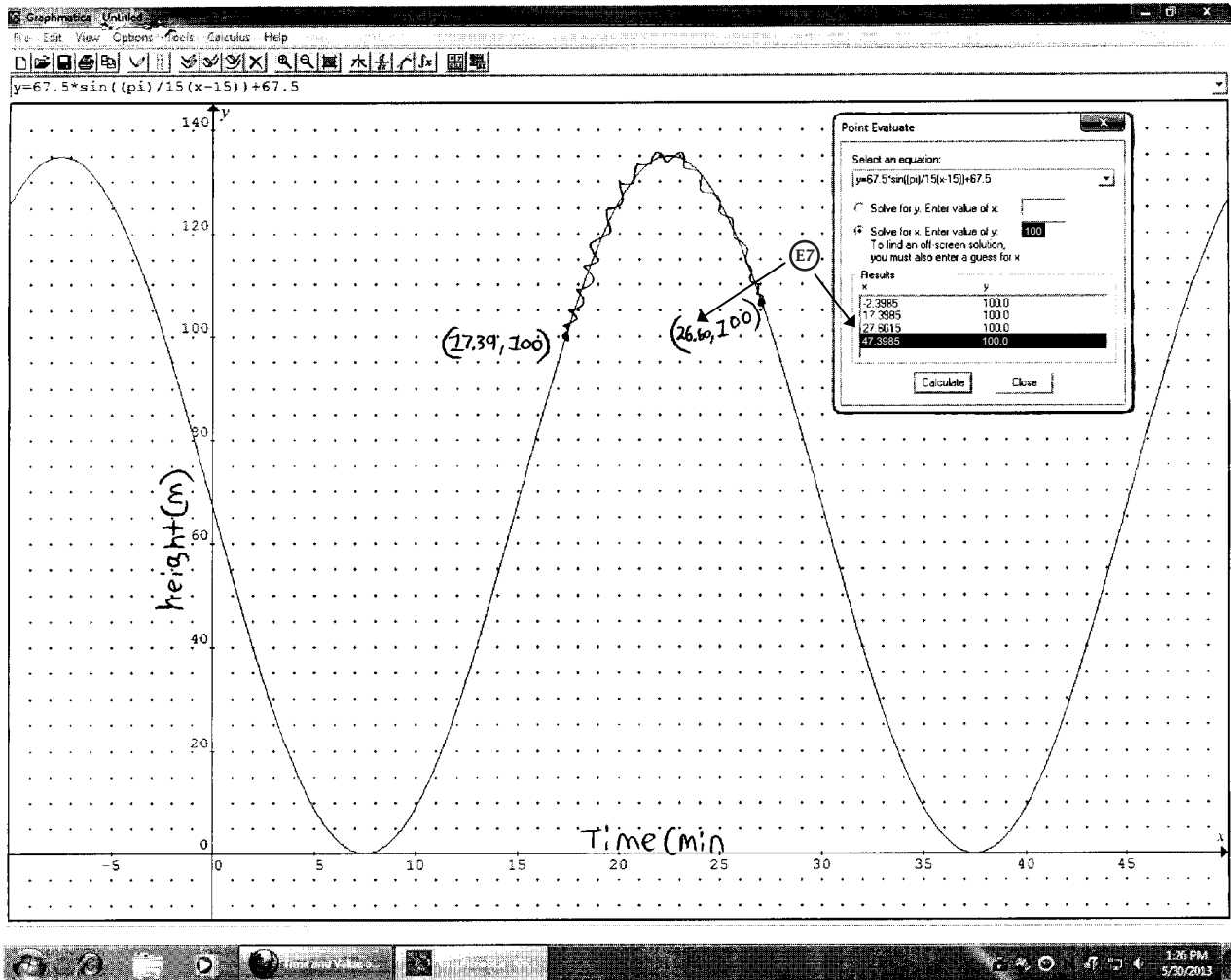
$$\begin{aligned}a &= 135 - 67.5 \\ &= 67.5\end{aligned}$$

$$\begin{aligned}b &= \frac{2\pi}{30} \\ &= \frac{\pi}{15}\end{aligned}$$

- b) How many minutes would a passenger be at least 100 m above the ground during one complete rotation? Show your work.

(2 marks)

Exemplar 1 (continued)



5. b) $26.60 - 17.40 = 9.20$ minutes

A passenger would be above 100 metres for at least 9.20 minutes

3 marks:

- ① → 1 mark for appropriate work in (a)
- ③ → 1 mark for appropriate work in (b)
- ④ → 1 mark for correct answer in (b)

Ⓔ7 → 0.5 mark deduction (if applicable) for making a transcription or transposition error

Exemplar 2

Question 5

Total: 4 marks

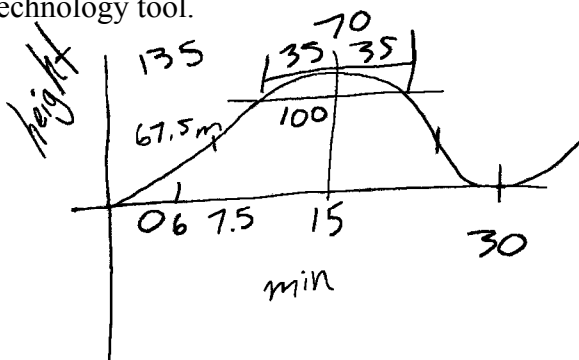
The London Eye is a giant Ferris wheel in London, England. It has a maximum height of 135 m, a minimum height of 0 m, and one complete rotation takes 30 min. The passengers get on the ride at the bottom of the wheel.

- a) Determine a sinusoidal equation that models this data. Explain how you arrived at your answer. Indicate the input values if you use a technology tool.

(2 marks)

$$y = a \sin (bx + c) + d$$

$$y = 67.5 \left(\frac{2\pi}{30} x + 7.5 \right) + 67.5$$



$$a = 67.5m$$

$$b = \frac{2\pi}{30}$$

$$c = 7.5$$

$$d = 67.5m$$

- b) How many minutes would a passenger be at least 100 m above the ground during one complete rotation? Show your work.

(2 marks)

A passenger would be at least 100m above ground for 7.78 minutes.

$$135m \div 15min = 9m/min$$

$$70m \div 9 = 7.777...$$

1 mark:

① → 1 mark for appropriate work in (a)

Exemplar 1

Question 7

Total: 1 mark

A national survey found that 83% of students like pizza. If three students are selected at random, what is the probability that all three students like pizza?

$$\text{prod} = 0.83^3 = 57.18\%$$

1 mark:

① → 1 mark for correct answer

Exemplar 1

Question 8

Total: 2 marks

There are 16 ducks on a pond and 7 of these ducks are female.

- a) Determine the probability of randomly selecting a female duck.

(1 mark)

7:16

- b) Determine the odds against selecting a female duck.

(1 mark)

9:7

2 marks:

- ① → 1 mark for correct probability in (a)
② → 1 mark for correct ratio in (b)

Exemplar 2

Question 8

Total: 2 marks

There are 16 ducks on a pond and 7 of these ducks are female.

- a) Determine the probability of randomly selecting a female duck.

(1 mark)

9:7 for male

$$P(\text{male}) = \frac{9}{16}$$

$$P(\text{female}) = \frac{7}{16} = 43.8\%$$

Ⓔ5

- b) Determine the odds against selecting a female duck.

(1 mark)

Odds against selecting female are 9:7

2 marks:

① → 1 mark for correct probability in (a)

② → 1 mark for correct ratio in (b)

Ⓔ5 → 0.5 mark deduction (if applicable) for rounding too soon or rounding incorrectly

Exemplar 1

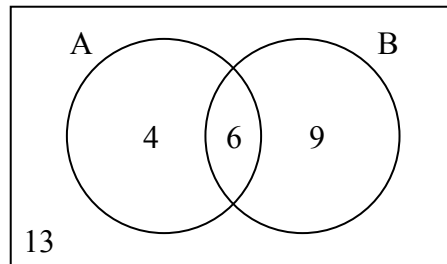
Question 9

Total: 2 marks

The following Venn diagram shows the enrolment of students in two extracurricular activities.

A: student council

B: golf



- a) Are these two activities mutually exclusive? Explain your reasoning.

(1 mark)

Yes, because 6 students are in both activities.

- b) Determine the probability that a student selected at random will not participate in either activity.

(1 mark)

$$\frac{13}{32} \times 100\% = 40.625\%$$

1 mark:

② → 1 mark for correct answer in (b)

Exemplar 1

Question 10**Total: 2 marks**

Laurel has a bag containing 5 blue marbles, 3 green marbles, and 2 red marbles.

Using the information above, create a scenario with 2 events that are dependent. Explain why they are dependent.

Drawing a green marble
and drawing a marble
that is not blue.

They are dependent because
a green marble is both.

0 marks:
→ no criteria met

Exemplar 1

Question 11**Total: 2 marks**

An art gallery wants to display some photographs in a row on a wall. There are 2 different colour photographs and 2 different black-and-white photographs.

Using all 4 photographs, how many different arrangements are possible if the colour photographs and black-and-white photographs must alternate? Show your work.

$$\frac{2}{1^{\text{st}}} \circ \frac{2}{2^{\text{nd}}} \circ \frac{1}{3^{\text{rd}}} \circ \frac{1}{4^{\text{th}}} = 4$$

There are 4 different arrangements

1 mark:

① → 1 mark for appropriate work

Exemplar 1

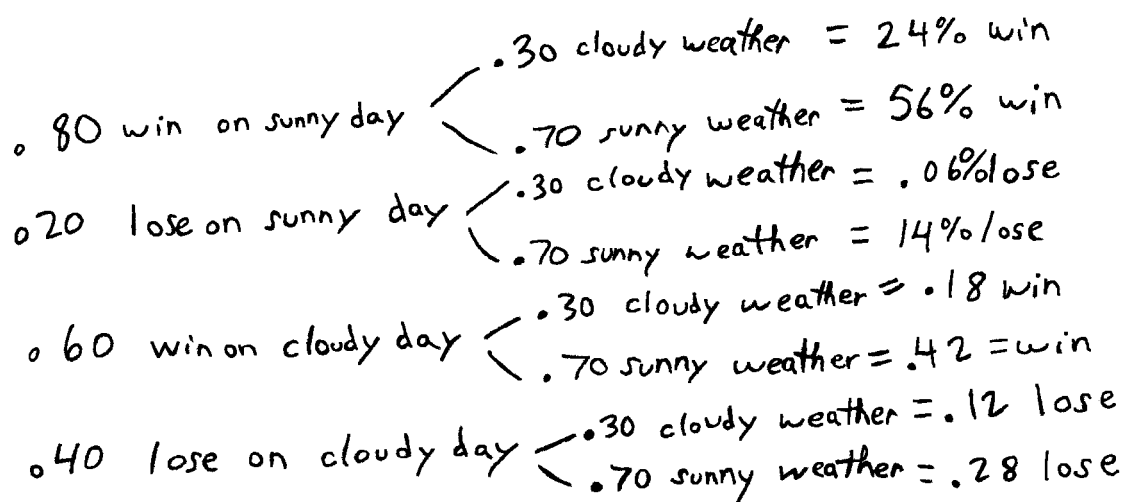
Question 12

Total: 3 marks

Based on the team's record, a local soccer team has a probability of 0.80 of winning their game on a sunny day. The probability of winning their game on a cloudy day is 0.60. The probability of cloudy weather on a given day is 0.30.

- a) Use a graphic organizer to show all the possible outcomes for this situation. (A graphic organizer is a visual representation of information. Examples include a tree diagram, a chart, a list, a Venn diagram, a truth table, Pascal's triangle, etc.)

(1 mark)



- b) Determine the probability that the soccer team wins. Show your work.

(2 marks)

Handwritten work for part (b):

- 56% win on sunny day w/ sunny weather
- 24% win on cloudy weather
- 0.18% win in cloudy day w/ cloudy weather
- 0.42% win cloudy day w/ sunny weather

1 mark:

② → 1 mark for appropriate work in (b)

Ⓔ4 → 0.5 mark deduction (if applicable) for not stating or incorrectly stating the final answer

Exemplar 2

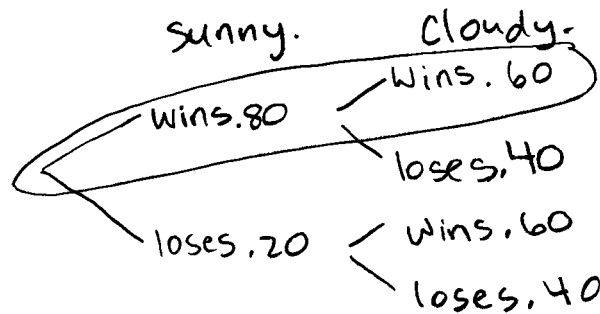
Question 12

Total: 3 marks

Based on the team's record, a local soccer team has a probability of 0.80 of winning their game on a sunny day. The probability of winning their game on a cloudy day is 0.60. The probability of cloudy weather on a given day is 0.30.

- a) Use a graphic organizer to show all the possible outcomes for this situation. (A graphic organizer is a visual representation of information. Examples include a tree diagram, a chart, a list, a Venn diagram, a truth table, Pascal's triangle, etc.)

(1 mark)



- b) Determine the probability that the soccer team wins. Show your work.

(2 marks)

$$.80 \times .60 = .48$$

There is a .48 probability that the soccer team wins.

1 mark:

③ → 1 mark for correct answer in (b)

Exemplar 1

Question 13

Total: 3 marks

A school principal is selecting students from a group of volunteers to organize a social event. There are 12 students in the group, 8 students from Class A and 4 students from Class B.

- a) How many different groups of 5 students can be created if there are no restrictions?

(1 mark)

$$12^C_5 = 762 \leftarrow \textcircled{E7}$$

762 different groups could be created w/ no restrictions.

- b) How many different groups of 5 students are possible which include at least 1 student from Class B? Show your work.

8 Class A 4 class B

(2 marks)

$$12^C_5 = 762 \text{ (All poss.)}$$

$$\begin{array}{l} 8^C_4 = 70 \quad 4^C_1 = 4 \\ 8^C_3 = 56 \quad 4^C_2 = 6 \\ 8^C_2 = 28 \quad 4^C_3 = 4 \\ 8^C_1 = 8 \quad 4^C_4 = 1 \end{array} \left. \begin{array}{l} \} 74 \\ \} 62 \\ \} 32 \\ \} 9 \end{array} \right\} 177$$

there are 177 possible different groups including at least 1 student from Class B.

2 marks:

- ① → 1 mark for correct answer in (a)
- ② → 1 mark for correct answer in (b)

.....
⑦ → 0.5 mark deduction (if applicable) for making a transcription or transposition error

Exemplar 2

Question 13

Total: 3 marks

A school principal is selecting students from a group of volunteers to organize a social event. There are 12 students in the group: 8 students from Class A and 4 students from Class B.

- a) How many different groups of 5 students can be created if there are no restrictions?

(1 mark)

$$\underline{12} \times \underline{11} \times \underline{10} \times \underline{9} \times \underline{8}$$

$$95,040$$

- b) How many different groups of 5 students are possible which include at least 1 student from Class B? Show your work.

(2 marks)

$$8P_4 \times 4P_1 = 6720$$

$$8P_3 \times 4P_2 = 4032$$

$$8P_2 \times 4P_3 = 1344$$

$$8P_1 \times 4P_4 = 192$$

$$= \frac{+}{12288} \text{ possible groups}$$

2 marks:

② → 1 mark for appropriate work in (b)

③ → 1 mark for correct answer in (b)

Exemplar 1

Question 16

Total: 1 mark

Explain why someone would choose to rent instead of purchase a house.

Because there is no interest when renting as opposed to buying a house

0 marks:
→ no criteria met

Exemplar 2

Question 16

Total: 1 mark

Explain why someone would choose to rent instead of purchase a house.

It would be cheaper because you wouldn't have a mortgage to pay off so you would be less in debt.

1 mark:

① → 1 mark for appropriate reason

Exemplar 1

Question 17

Total: 1 mark

Aamina invests \$7500.00 in a guaranteed investment certificate (GIC). What is the rate of return on her investment if the GIC is worth \$7800.00 after one year?

$$\left(\frac{7800 - 7500}{7500} \right) \times 100 = 3.85$$

\therefore A 3.85% rate of return

0 marks:
→ no criteria met

Exemplar 2

Question 17

Total: 1 mark

Aamina invests \$7500.00 in a guaranteed investment certificate (GIC). What is the rate of return on her investment if the GIC is worth \$7800.00 after one year?

$$\begin{array}{l} 7500\$ - 100\% \\ 7800\$ - x\% \end{array}$$

$$\frac{7800\$ \cdot 100\%}{7500\$} = \boxed{104\%}$$

0 marks:

→ no criteria met

Exemplar 1

Question 19**Total: 2 marks**

You must choose between investing in the stock market or buying a 5-year guaranteed investment certificate (GIC).

- a) Provide one disadvantage of investing in the stock market.

(1 mark)

Stock Market can crash anytime.

- b) Provide one disadvantage of buying the GIC.

(1 mark)

They have your business for 5 years

2 marks:

- ① → 1 mark for correct disadvantage for the stock market in (a)
② → 1 mark for correct disadvantage for the GIC in (b)

Exemplar 2

Question 20

Total: 4 marks

Petra and Sabine are comparing bank loans. Both plan to borrow \$65 000.00 at an interest rate of 5.00% for 3 years.

- Petra's loan will be compounded quarterly and she will make quarterly payments.
- Sabine's loan will be compounded monthly and she will make monthly payments.

Calculate the total amount paid for each loan. Show your work.

Petra

$$\begin{aligned}N &= 12 \\I\% &= 5 \\PV &= 65\,000.00 \\PMT &= -5866.79 \\FV &= 0 \\P/Y &= 4 \\C/Y &= 4\end{aligned}$$
$$\Sigma \ln t(1, 12)$$
$$-2782.28 \$$$
$$65\,000.00 + 2782.28 =$$
$$\underbrace{67782.28 \$}_{\text{Total paid}}$$

Sabine

$$\begin{aligned}N &= 36 \\I\% &= 5 \\PV &= 65\,000.00 \\PMT &= -1948.11 \\FV &= 0 \\P/Y &= 12 \\C/Y &= 12\end{aligned}$$
$$\Sigma \ln t(1, 36)$$
$$-5131.90 \$$$
$$65\,000.00 + 5131.90 =$$
$$\underbrace{70\,131.90 \$}_{\text{Total paid}}$$

3 marks:

- ① → 1 mark for appropriate work
- ② → 1 mark for correct payment for Petra
- ③ → 1 mark for correct payment for Sabine

Exemplar 1

Question 21

Total: 5 marks

Luis wants a new computer. The total cost of the computer is \$2014.00 (taxes included). He wonders which would be the better option, getting a loan to purchase the computer or leasing the computer.

Option 1: Getting a loan

- interest rate of 6.25%, compounded monthly
- monthly payments for 2 years

Option 2: Leasing

- monthly payments of \$80.00 (taxes included) for 2 years
- purchase the computer at the end of the lease for \$400.00 (taxes included)

a) What would be Luis' monthly payment with Option 1? Show your work.

(2 marks)

$$\begin{aligned} N &= 24 \\ I &= 6.25 \\ PV &= 2275.82 \\ * PMT &= -101.12 \\ FV &= 0 \\ P/Y &= 12 \\ C/Y &= 12 \\ \text{END} \end{aligned}$$

His monthly
payments are
\$101.12

$$\begin{aligned} & \$2014.00 \\ & \times 1.13 \text{ (Taxes)} \\ \hline & \$2275.82 \\ \hline & \text{Total cost} \end{aligned}$$

Exemplar 1 (continued)

b) Calculate the total cost for Option 1 and for Option 2.

(2 marks)

option 1	option 2
$ \begin{array}{r} \$1011.2 \\ \times \quad 12 \text{ months} \\ \times \quad 2 \text{ years} \\ \hline \$2426.88 \end{array} $	<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 80%;"> $\begin{array}{r} \\$80.00 \\ \times \quad 12 \text{ months} \\ \times \quad 2 \text{ years} \\ \hline \\$1920 \text{ Total lease cost} \\ + \\$452 \text{ buying out at end} \\ \hline \\$2372 \end{array}$ </div> <div style="width: 15%; text-align: right; padding-right: 10px;"> $\begin{array}{r} \\$400 \\ \times 1.13 \text{ Taxes} \\ \hline \\$452 \end{array}$ </div> </div> <p style="text-align: right; margin-top: 10px;">Total cost of leasing & buy out</p>
<p>The total cost of getting a loan is \$2426.88</p>	

c) Which option should Luis choose? Explain your reasoning.

(1 mark)

If hes just going to buy the computer anyways he might as well lease it for cheaper.

4 marks:

- ② → 1 mark for correct answer in (a)
- ③ → 1 mark for correct total cost of Option 1 in (b)
- ④ → 1 mark for correct total cost of Option 2 in (b)
- ⑤ → 1 mark for appropriate explanation in (c)

Note: Mark ① deducted for incorrectly applying taxes.

Exemplar 2

Question 21

Total: 5 marks

Luis wants a new computer. The total cost of the computer is \$2014.00 (taxes included). He wonders which would be the better option, getting a loan to purchase the computer or leasing the computer.

Option 1: Getting a loan

- interest rate of 6.25%, compounded monthly
- monthly payments for 2 years

Option 2: Leasing

- monthly payments of \$80.00 (taxes included) for 2 years
- purchase the computer at the end of the lease for \$400.00 (taxes included)

a) What would be Luis' monthly payment with Option 1? Show your work.

(2 marks)

$$\begin{aligned} &TVm \\ &N=24 \\ &I\% = 6.25 \\ &PV = -2014 \\ &Pmt = \text{Alpha enter} = 89.5 \\ &FV = 0 \\ &PY = 12 \\ &CY = 12 \\ &\boxed{\text{end}} \end{aligned}$$

he would pay
\$89.5/month.

E4

E5

Exemplar 2 (continued)

b) Calculate the total cost for Option 1 and for Option 2.

(2 marks)

$$1 = \$2148$$
$$89.5/m$$

$$2 = \overset{\textcircled{E2}}{\downarrow} 2320$$
$$80/5 + 400 \text{ after 2 years}$$

c) Which option should Luis choose? Explain your reasoning.

(1 mark)

Option 1 because he will save money.

5 marks:

- ① → 1 mark for appropriate work in (a)
- ② → 1 mark for correct answer in (a)
- ③ → 1 mark for correct total cost of Option 1 in (b)
- ④ → 1 mark for correct total cost of Option 2 in (b)
- ⑤ → 1 mark for appropriate explanation in (c)

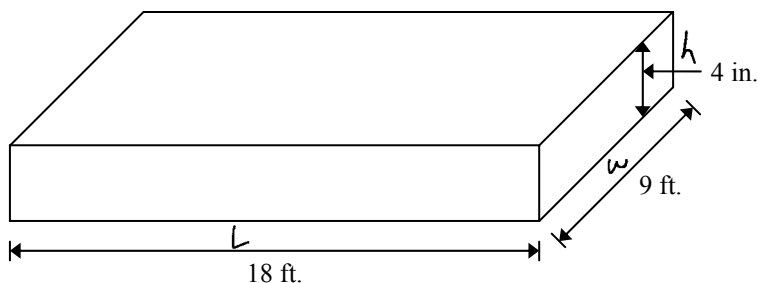
-
- Ⓔ → 0.5 mark deduction (if applicable) for not including the units in the final answer
 - Ⓕ → 0.5 mark deduction (if applicable) for not stating or incorrectly stating the final answer
 - Ⓖ → 0.5 mark deduction (if applicable) for rounding too soon or rounding incorrectly

Exemplar 1

Question 23

Total: 2 marks

A student was given the following diagram and was asked: “How many cubic yards of soil are required to fill this garden with 4 inches of soil?” (Diagram is not drawn to scale.)



The student provided this answer: $18 \times 9 \times \frac{1}{3} = 54 \text{ ft}^3 = 18 \text{ yd}^3$

Explain the student's error and provide the correct answer. 648 216

The student somehow got $\frac{1}{3}$ when they could have just used 4.

The correct answer is

$$18 \cdot 9 \cdot 4 = 648 \text{ ft}^3 / 3 = 216 \text{ yd}^3$$

0 marks:

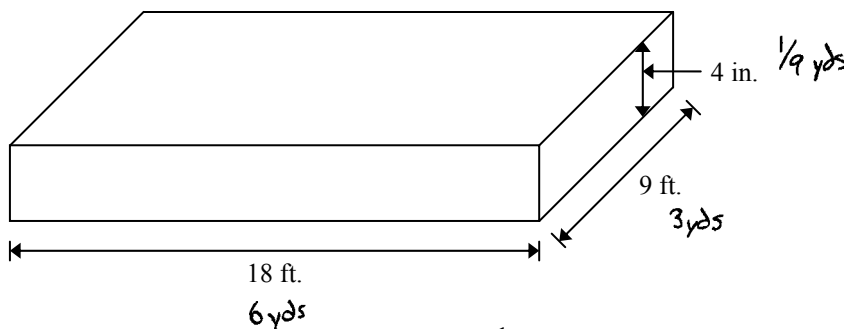
→ no criteria met

Exemplar 2

Question 23

Total: 2 marks

A student was given the following diagram and was asked: “How many cubic yards of soil are required to fill this garden with 4 inches of soil?” (Diagram is not drawn to scale.)



The student provided this answer: $18 \times 9 \times \frac{1}{3} = 54 \text{ ft}^3 = 18 \text{ yd}^3$

Explain the student's error and provide the correct answer.

The student should have first converted all units to yards, then calculated the total.

$$6 \times 3 \times \left(\frac{1}{9}\right) = 2 \text{ yd}^3$$

2 yd³ of soil required

2 marks:

① → 1 mark for correct explanation

② → 1 mark for correct answer

Exemplar 1

Question 24**Total: 3 marks**

A bathroom floor is covered by 15 floor tiles. Each tile measures 18 in. \times 18 in.

- a) How many floor tiles measuring 6 in. \times 6 in. would be needed to cover the same area?
Show your work.

(2 marks)

$$18 \times 18 = 324 \div (6 \times 6) = 9$$

- b) You would like to redo the floor with 6 in. \times 6 in. tiles. These tiles are sold in packages of 5 tiles and cost \$4.00 per package (taxes included). How much would it cost to buy the number of tiles you calculated in (a)?

(1 mark)

\$8

2 marks:

- ② \rightarrow 1 mark for correct answer in (a)
③ \rightarrow 1 mark for correct answer in (b)

Exemplar 1

Question 26**Total: 1 mark**

Given the following universal set: $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

Give an example of two disjoint subsets of U .

ⓔ4
↓
 $A = \text{Even numbers}$
 $B = \text{Odd numbers}$

1 mark:

① → 1 mark for correct answer

ⓔ4 → 0.5 mark deduction (if applicable) for not stating or incorrectly stating the final answer

Exemplar 1

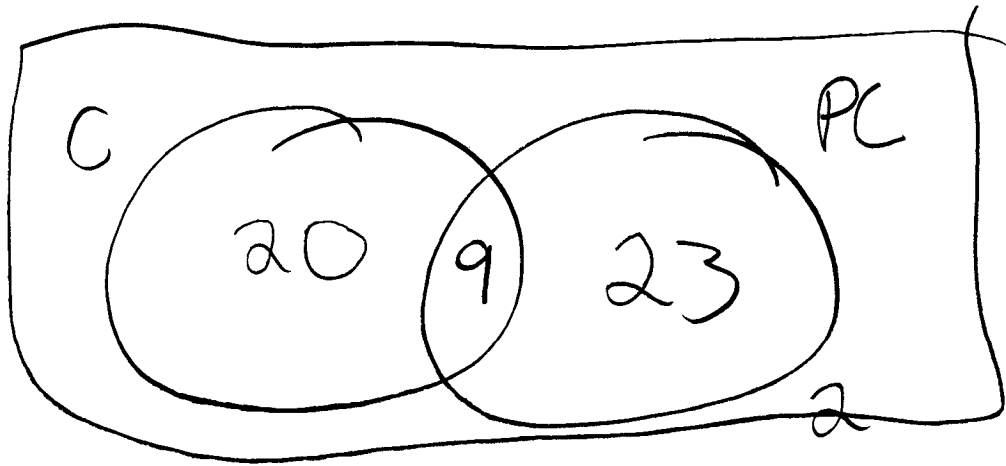
Question 27

Total: 2 marks

A survey was conducted on 50 randomly selected people to see what snacks they preferred.

Preferred Snack	Number of People
chocolate bar	20
potato chips	23
both snacks	9

How many people **do not like any** of the snacks indicated above? Show your work.



2 people didnt
like any of
them.

who doesnt like
chocolate or chips....

0 marks:
→ no criteria met

Exemplar 2

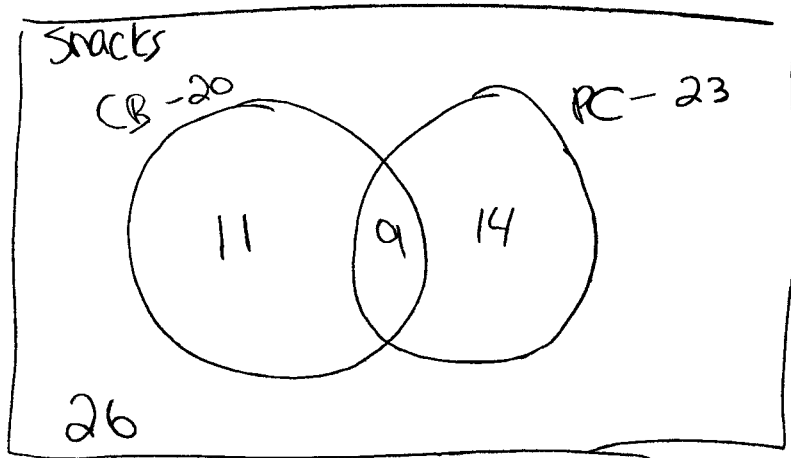
Question 27

Total: 2 marks

A survey was conducted on 50 randomly selected people to see what snacks they preferred.

Preferred Snack	Number of People
chocolate bar	20
potato chips	23
both snacks	9

How many people **do not like any** of the snacks indicated above? Show your work.



CB - Chocolate Bar

PC - Potato chips

$$11 + 9 + 14 = 24 \text{ kids}$$

$$50 - 24 = 26$$

26 kids did not like any snacks which were indicated.

1 mark:

① → 1 mark for appropriate work

Exemplar 1

Question 28**Total: 3 marks**

Given the statement: "If a number is a multiple of 3, then it is a multiple of 9."

- a) Provide a counterexample for the given statement.

(1 mark)

If a number multiple by 9, then it is multiple by 6

- b) Write the contrapositive of the given statement.

(1 mark)

If a number is not multiple by 9, then the number is not multiple by 3.

- c) Write the inverse of the given statement.

(1 mark)

If a number is not multiple by 3, then it is not multiple by 9.

2 marks:

② → 1 mark for writing the contrapositive in (b)

③ → 1 mark for writing the inverse in (c)

Exemplar 2

Question 28

Total: 3 marks

Given the statement: "If a number is a multiple of 3, then it is a multiple of 9."

- a) Provide a counterexample for the given statement.

(1 mark)

"if a number is a multiple of 9, then it is a multiple of 18"

- b) Write the contrapositive of the given statement.

(1 mark)

"If a number is not a multiple of 3, then it is not a multiple of 9"

- c) Write the inverse of the given statement.

(1 mark)

"If a number is a multiple of 9, then it is a multiple of 3"

<p>0 marks: → no criteria met</p>
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Appendices

Appendix A: Table of Questions by Unit and Learning Outcome

Unit	Question	Type	Learning Outcome	Mark
A	1	MC	12A.R.2	1
A	2	LA	12A.R.1	3
A	3	LA	12A.R.1	3
A	4	LA	12A.R.2	3
A	5	LA	12A.R.3	4
Total = 14				
B	6	MC	12A.P.4, 12A.P.5	1
B	7	SA	12A.P.4	1
B	8	SA	12A.P.1	2
B	9	SA	12A.P.2	2
B	10	SA	12A.P.3	2
B	11	SA	12A.P.5	2
B	12	LA	12A.P.3	3
B	13	LA	12A.P.6	3
Total = 16				
C	14	MC	12A.FM.1	1
C	15	MC	12A.FM.3	1
C	16	SA	12A.FM.2	1
C	17	SA	12A.FM.3	1
C	18	SA	12A.FM.1	1
C	19	SA	12A.FM.3	2
C	20	LA	12A.FM.1	4
C	21	LA	12A.FM.1, 12A.FM.2	5
Total = 16				
D	22	MC	12A.D.1	1
D	23	SA	12A.D.1	2
D	24	LA	12A.D.1	3
Total = 6				
E	25	MC	12A.L.3	1
E	26	SA	12A.L.2	1
E	27	SA	12A.L.2	2
E	28	LA	12A.L.3	3
Total = 7				

Legend for Units:

A: Relations and Functions
 B: Probability
 C: Financial Mathematics
 D: Design and Measurement
 E: Logical Reasoning

Legend for Question Types:

MC: Multiple Choice
 SA: Short Answer
 LA: Long Answer

Appendix B: Table of Questions by Type and Learning Outcome

Type	Question	Unit	Learning Outcome	Mark
MC	1	A	12A.R.2	1
MC	6	B	12A.P.4, 12A.P.5	1
MC	14	C	12A.FM.1	1
MC	15	C	12A.FM.3	1
MC	22	D	12A.D.1	1
MC	25	E	12A.L.3	1
Total = 6				
SA	7	B	12A.P.4	1
SA	8	B	12A.P.1	2
SA	9	B	12A.P.2	2
SA	10	B	12A.P.3	2
SA	11	B	12A.P.5	2
SA	16	C	12A.FM.2	1
SA	17	C	12A.FM.3	1
SA	18	C	12A.FM.1	1
SA	19	C	12A.FM.3	2
SA	23	D	12A.D.1	2
SA	26	E	12A.L.2	1
SA	27	E	12A.L.2	2
Total = 19				
LA	2	A	12A.R.1	3
LA	3	A	12A.R.1	3
LA	4	A	12A.R.2	3
LA	5	A	12A.R.3	4
LA	12	B	12A.P.3	3
LA	13	B	12A.P.6	3
LA	20	C	12A.FM.1	4
LA	21	C	12A.FM.1, 12A.FM.2	5
LA	24	D	12A.D.1	3
LA	28	E	12A.L.3	3
Total = 34				

Legend for Question Types:

MC: Multiple Choice
SA: Short Answer
LA: Long Answer

Legend for Units:

A: Relations and Functions
B: Probability
C: Financial Mathematics
D: Design and Measurement
E: Logical Reasoning

Appendix C: Irregularities in Provincial Tests

A Guide for Local Marking

During the marking of provincial tests, irregularities are occasionally encountered in test booklets. The following list provides examples of irregularities for which an *Irregular Test Booklet Report* should be completed and sent to the Department:

- completely different penmanship in the same test booklet
- incoherent work with correct answers
- notes from a teacher indicating how he or she has assisted a student during test administration
- student offering that he or she received assistance on a question from a teacher
- student submitting work on unauthorized paper
- evidence of cheating or plagiarism
- disturbing or offensive content
- no responses provided by the student (all “NR”) or only incorrect responses (“0”)

Student comments or responses indicating that the student may be at personal risk of being harmed or of harming others are personal safety issues. This type of student response requires an immediate and appropriate follow-up at the school level. In this case, please ensure the Department is made aware that follow-up has taken place by completing an *Irregular Test Booklet Report*.

Except in the case of cheating or plagiarism where the result is a provincial test mark of 0%, it is the responsibility of the division or the school to determine how they will proceed with irregularities. Once an irregularity has been confirmed, the marker prepares an *Irregular Test Booklet Report* documenting the situation, the people contacted, and the follow-up. The original copy of this report is to be retained by the local jurisdiction and a copy is to be sent to the Department along with the test materials.

Irregular Test Booklet Report

Test: _____

Date marked: _____

Booklet No.: _____

Problem(s) noted: _____

Question(s) affected: _____

Action taken or rationale for assigning marks: _____

Follow-up: _____

Decision: _____

Marker's Signature: _____

Principal's Signature: _____

<p>For Department Use Only—After Marking Complete</p> <p>Consultant: _____</p> <p>Date: _____</p>
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