Grade 12
Essential Mathematics
Achievement Test

Student Booklet

June 2026

Manitoba

Grade 12 Essential Mathematics Achievement Test:
Student Booklet (June 2026)

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Manitoba Education and Early Childhood Learning
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Available in alternate formats upon request.

Grade 12 Essential Mathematics Achievement Test
Student Booklet (June 2026)

Description

Time Required to Complete the Test: 2 hours
Additional Time Allowed: 30 minutes

This test consists of six parts:

Vehicle Finance	14
Statistics	12
Home Finance	14
Precision Measurement	12
Geometry and Trigonometry	13
Probability	9
Total Possible Marks:	**74**

Directions

- Show all your work.
- Use your *Formula Sheet* and your study sheet.
- Your answers should be neat, organized, and clear.
- Let the mark values for each question guide you in answering the question.
- Include units in your final answer.
- Make sure your calculator is set to degree mode.
- Express answers in decimal and percentage form to at least **the nearest hundredth** (two decimal places) when rounding.

  Example: $\frac{15}{29} = 0.52$ or 51.72%

  Note: Do not round answers in the Precision Measurement unit.
- Some answers are to be given as decimal values. Rounding too early in your solution may result in an inaccurate final answer for which full marks will not be given.
- When no tax calculation is necessary, the wording “taxes included” will be used. When you are required to add taxes, the wording “plus taxes” will be used.
- Note that all scenarios described in test questions take place in Manitoba.

Electronic communication between students through phones, email, or file sharing during the test is strictly prohibited. Please turn off your cell phone and all other such devices.

Terminology Sheet

Some questions may include directing words such as *explain*, *state*, and *calculate*.
These words are explained below.

The word	The question is asking for…
identify	the appropriate answer(s) from a given list of choices
state	a word, sentence, or number, without an explanation
describe/explain	words or symbols, diagrams, charts or graphs, or other method that clearly shows what you are thinking
justify	an explanation, information, or evidence that shows why your method, idea, or answer is correct
sketch/illustrate	a reasonably neat picture or diagram (not necessarily to scale) that clearly shows or explains an idea, concept, or method
calculate	a mathematical formula, an algebraic equation, or a numerical calculation to solve a problem
determine	a verification or confirmation by count, observation, formula, pattern, use of a table, etc.

PLEASE WAIT UNTIL INSTRUCTED TO PROCEED.

Vehicle Finance

Question 1

1 mark 101

Raphaël bought a car for $33 500. After one year, his vehicle has a value of $28 475.

Identify the vehicle's depreciation rate, as a percentage.

A) 85%

B) 20%

C) 18%

D) 15%

Answer: _____

Question 2

1 mark

102

A motorcycle has a fuel tank size of 20 L and can travel 550 km with a full tank of gas.

Calculate the fuel economy for the motorcycle.

Show your work.

Question 3

3 marks

A 48-month vehicle lease agreement includes a monthly payment of $850, taxes included, and a down payment of $1500.

A) Calculate the total amount paid at the end of the lease. (1.5 marks)

Show your work.

B) The original price of the vehicle is $72 000 and its residual value is 54%.

Calculate the buyout price of the vehicle after the lease, plus taxes. (1.5 marks)

Show your work.

Question 4

1 mark

105

Lilja paid $2375 for her car insurance premium last year.

When she received her bill this year she owed $2325.

Identify one reason why Lilja's insurance premiums have been reduced.

A) Moved up on the driver safety rating scale

B) Was involved in a single-vehicle collision

C) Increase in driver's age

D) An at-fault driver paid her premium

Answer: _____

Question 5

1 mark

Soka leased a vehicle for 2 years. At the end of the lease, Soka is considering the following options:

- Keep the vehicle and pay its residual value.
- Purchase a new version of the same model.

Soka can afford either option.

Justify why Soka should pay the residual value of the leased vehicle instead of buying a new vehicle.

Question 6

3 marks

Sara is purchasing a truck from a Manitoba dealership for $38 000, plus taxes. She has $9500 saved for a down payment.

A) Calculate the amount Sara needs to borrow to purchase the truck. (2 marks)

Show your work.

B) Sara can get a loan for 5 years at 6.25% per annum.

Calculate the amount of interest she will pay in the first month. (1 mark).

Show your work.

Question 7

3 marks

Mikwan wants to buy a new vehicle with a suggested retail price of $24 750 to replace her current car. She has the option to either trade in the vehicle at the dealership or sell it privately.

A) Calculate the total cost of the new vehicle, plus taxes, if she is offered $7000 for her trade-in. (2 marks)

Show your work.

B) Mikwan's old car has a book value of $8000. She could sell her vehicle privately and use the money as a down payment.

The total cost for the new vehicle would be $19 720, including taxes.

Explain why Mikwan might choose to trade-in the vehicle, regardless of the cost difference. (1 mark)

Question 8

1 mark

111

Imran drives to his office for work 10 days a month.

Identify the type of insurance Imran needs to purchase for his vehicle.

A) Pleasure

B) All-purpose

C) Farming all-purpose

D) Lay-up

Answer: _____

Statistics

112
113

Question 9

3 marks

A bakery recorded the number of cups of coffee they sold for the past 18 days in the chart below.

154	154	154	167	167	167	174	174	174
180	180	180	201	201	201	210	210	210

A) Calculate the mean number of cups of coffee sold. (2 marks)

Show your work.

B) A student said that the mode of cups of coffee was 154, 167, 174, 180, 201, and 210.

Describe their error. (1 mark)

Question 10

1 mark

Rachelle wrote a chemistry test and told her parents that she was in the 110^{th} percentile for the test.

Explain why it is not possible for Rachelle to be in the 110^{th} percentile.

Question 11

3 marks

Ruiz received the following marks on his math tests this semester:

35 56 66 71 88 98

A) Calculate the mean and trimmed mean of his final math grade. (2 marks)

Show your work.

B) Justify which mean Ruiz would want used to calculate his final math grade. (1 mark)

Question 12

1 mark

Identify the statement that is true about the data set:

3 4 5 6 7 7 10

A) The mean is equal to the mode.

B) The mean is equal to the median.

C) The mean is greater than the mode.

D) The mean is less than the median.

Answer: _____

Question 13

2 marks

The mean price of a jug of milk at a local grocery store is $9.00. The prices for the last 5 weeks are given below.

Week	Price
Week 1	$8.29
Week 2	$9.98
Week 3	x
Week 4	$8.75
Week 5	$9.25

Calculate the price of milk in week 3.

Show your work.

Question 14

2 marks

The weights of checked bags, in pounds, are given for a sample of 20 passengers.

12	22	29	32	42
18	22	29	33	43
20	26	30	34	45
21	27	31	36	45

Calculate the percentile rank of a checked bag with a weight of 31 pounds.

Show your work.

Home Finance

Question 15

3 marks

A farm property worth $680 000 has a portioned assessment of 26%. The municipal tax rate is 21.31 mills. The education taxes are $2750. The farmer also pays $225 for road oiling along the property.

A) Calculate the portioned assessment. (1 mark)

Show your work.

B) Calculate the municipal tax. (1 mark)

Show your work.

C) Calculate the total property tax owing. (1 mark)

Show your work.

Question 16

1 mark

123

Cooper was not able to visit his cottage during the winter. When he arrived in the spring, he discovered a leak in the bedroom ceiling.

State one preventative maintenance task that Cooper could have done prior to winter to avoid the leak.

Question 17

2 marks

A homeowner replaced their incandescent light bulbs with LED bulbs. This reduced their energy usage from 43.920 kW.h to 8.784 kW.h.

The electricity rate is $0.24/kW.h.

Calculate how much money they saved.

Show your work.

Question 18

1 mark

125

A homeowner increased their insurance coverage which added $522 to their annual premium.

Calculate the additional insurance cost for the remaining 7 months of their policy year.

Show your work.

Question 19

3 marks

Adelia purchased a $298 000 home and made a 5% down payment.

A) Calculate Adelia's down payment. (0.5 mark)

B) Financial institutions must charge an additonal 4% for insurance on the mortgage amount, when the home buyer makes a smaller down payment.

Calculate the total amount Adelia borrowed, including insurance. (1.5 marks)

Show your work.

C) Calculate Adelia's monthly mortgage payment if she pays $6.70 per thousand dollars borrowed. (1 mark)

Show your work.

Question 20

1 mark

Identify which factor affects the mortgage amount that a financial institution would approve.

A) Land Transfer Tax

B) Income of applicant

C) Cost of homeowner's insurance

D) Age of applicant

Answer: _____

Question 21

1 mark

130

Kyah was approved for a $326 000 mortgage. In addition to her down payment, she has saved $800 for closing costs.

Justify why $800 is not enough to pay the closing costs to purchase a house.

Question 22

2 marks

131

Conner wants to be approved for a mortgage. He has found a house with a monthly heating cost of $175, and a monthly property tax of $325. Conner's gross monthly income is $5400.

Calculate the maximum amount his monthly mortgage payment can be in order to meet the Gross Debt Service Ratio (GDSR) requirement for approval.

Show your work.

Precision Measurement

Note: Do not round answers in this section.

Question 23

2 marks

132

A customer orders a medium-well steak. The temperature of the steak must be between 140° F and 145° F.

State the measurement in the form:

$$\text{nominal value} \pm \frac{1}{2} \text{ tolerance}$$

Question 24

2 marks

A carpenter needs to measure a piece of wood to 48 centimetres. They can use a meter stick measured in 1 mm increments, or a tape measure with $\frac{1}{16}$ inch increments.

A) Justify which measuring instrument the carpenter should use. (1 mark)

B) State the uncertainty of the measuring instrument you chose in Part A. (1 mark)

Question 25

1 mark

135

Your science teacher asks you to recalibrate a scale to 0 grams.

Identify which aspect of measurement is most affected.

A) Tolerance

B) Precision

C) Uncertainty

D) Accuracy

Answer: _____

Question 26

2 marks

Leo competed in a snowboard race and finished with a time of 73.26 seconds.

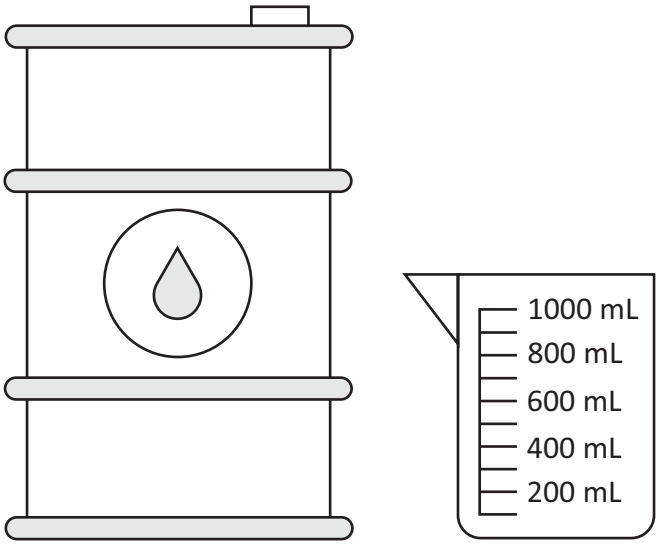
A) State the precision of his time. (1 mark)

B) State the uncertainty of his time. (1 mark)

Question 27

3 marks

A farmer wants to remove 2500 mL of oil from a container that has exactly 18 L of oil. She uses a 1000 mL (1 L) container marked as shown below.



18 L 1000 mL

Calculate the remaining amount of oil that will be in the container in the form:

measurement $\pm$ uncertainty

Show your work.

Question 28

1 mark

Identify the form of tolerance that allows for a minimum value of less than 105.7 cm.

A) $106.3\ \text{cm}^{+1.3\ \text{cm}}_{-0.4\ \text{cm}}$

B) $105.8\ \text{cm} \pm 0.5\ \text{cm}$

C) $\begin{matrix}106.3\ \text{cm} \\ 105.7\ \text{cm}\end{matrix}$

D) $105.7\ \text{cm}^{+1\ \text{cm}}_{-0\ \text{cm}}$

Answer: _____

Question 29

1 mark

140

A part for a machine is to be made to the length specification of $13.8\ \text{mm}^{+0.5\ \text{mm}}_{-0\ \text{mm}}$.

Justify whether a 14.1 mm part will meet the length specification, referring to the maximum and minimum acceptable values.

Geometry and Trigonometry

Question 30

1 mark

141

Four properties of an isoceles trapezoid are listed below.

Identify one property that also belongs to a rectangle.

A) Only one set of parallel sides

B) Not all consecutive angles are supplementary

C) Diagonals are congruent

D) Opposite angles are not congruent

Answer: _____

Question 31

2 marks

State a quadrilateral that can have:

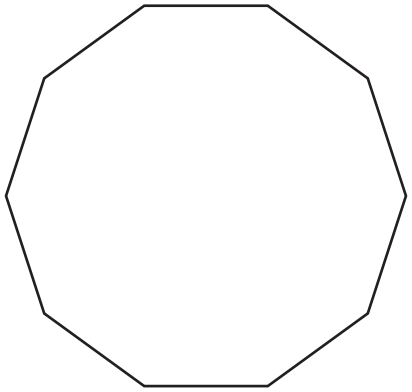
A) four congurent sides and no right angles. (1 mark)

B) two non-congruent diagonals. (1 mark)

Question 32

2 marks

A teacher drew this regular polygon on the board.



A) Calculate the sum of all of the interior angles. (1 mark)

Show your work.

B) Calculate the measure of one interior angle. (1 mark)

Show your work.

Question 33

1 mark

146

A regular polygon has a central angle of 30°.

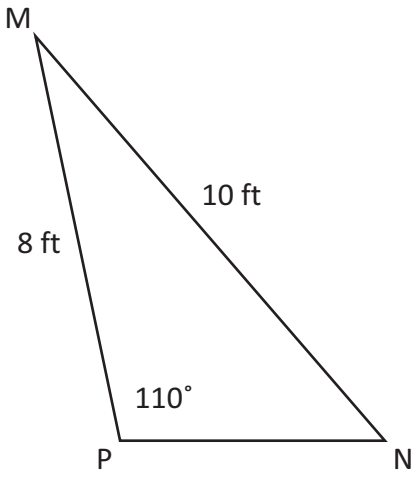
State the number of sides of this polygon.

Question 34

2 marks

147

Refer to the triangle below:



Calculate the measure of angle N.

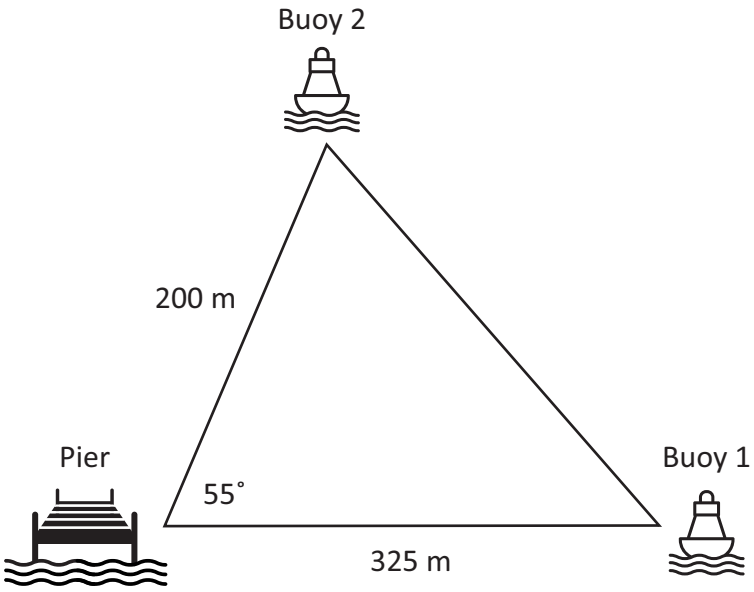
Show your work.

Question 35

3 marks

Sutter is a lifeguard and sets up the buoys for a swimming competition.

The first buoy is 325 m from the pier, and the second is 200 m. The angle between these paths is 55°.



Competitors will swim from the pier to buoy 1, then to buoy 2 and back to the pier.

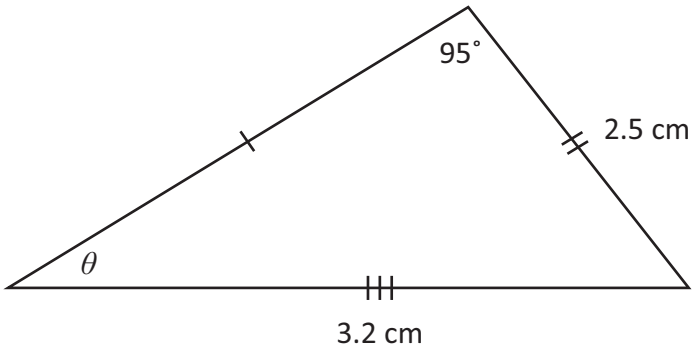
Calculate the total length of the swim route.

Show your work.

Question 36

2 marks

Given the triangle:



A) Identify which formula you would use to determine the value of θ. (1 mark)

A) Pythagorean theorem

B) Cosine law

C) Sine law

D) Not enough information

Answer: _____

B) State the type of triangle drawn above. (1 mark)

Probability

Question 37

1 mark

151

Gina is the goalie. In one game, she allowed 4 goals out of 37 shots.

Identify the odds against Gina allowing a goal.

A) 37:4

B) 4:37

C) 4:33

D) 33:4

Answer: _____

Question 38

1 mark

152

There is a probability of 0.6% that a golfer will get a hole-in-one.

Calculate how many golfers should get a hole-in-one if there are 334 golfers.

Show your work.

Question 39

1 mark

153

A restoration company found that 15 out of 700 homes contain asbestos.

Explain whether this is experimental or theoretical probability.

Question 40

2 marks

At Paint Lake Provincial Park, 150 campers apply for the 82 seasonal sites available. A draw is held to decide which campers receive a seasonal site.

A) State the probability of a camper being awarded a site. (1 mark)

B) State the odds of a camper being awarded a site. (1 mark)

Question 41

1 mark

156

The cheerleading team is having a raffle to raise money. The odds against winning a jersey are 63:2.

State the probability that you will win a jersey.

Question 42

2 marks

A commercial gardener buys bean seeds each year at a fixed cost of $450.

There are only two possible outcomes for the crop:

- A probability of $\frac{7}{8}$ that the crop is successful and the gardener earns $5000 in sales.
- A probability of $\frac{1}{8}$ that the crop fails completely and the gardener earns $0 in sales.

Calculate the expected profit of the gardener's crop for the year.

Show your work.

Question 43

1 mark

158

Lindsay rolls a fair octahedron (8-sided die). Its sides are numbered 1 through 8.

State the probability, as a decimal, that he will roll a number less than 6.

Formula Sheet: Essential Mathematics

Name of Formula	Formula	Details
Percentile Rank (PR)	$PR = \frac{b}{n} \times 100$	b = number of raw scores below the given score n = total number of raw scores
Simple Interest (I)	$I = Prt$	P = principal r = annual interest rate t = time in years
Education Tax or Municipal Tax	$\text{Tax} = \text{Portioned assessment} \times \frac{\text{mill rate}}{1000}$	
Gross Debt Service Ratio ($GDSR$)	$GDSR = \frac{\left(\begin{array}{c}\text{Monthly}\\ \text{mortgage}\\ \text{payment}\end{array} + \begin{array}{c}\text{Monthly}\\ \text{property}\\ \text{taxes}\end{array} + \begin{array}{c}\text{Monthly}\\ \text{heating}\\ \text{costs}\end{array}\right)}{\text{Gross monthly income}} \times 100$	
Fuel Economy in L / 100 km (FE)	$FE = \frac{\text{Fuel used in litres}}{\text{Distance travelled in km}} \times 100 \text{ km}$	
Sum of Interior Angles of Polygons (S)	$S = 180° (n - 2)$	n = number of sides
Measure of One Interior Angle of a Regular Polygon	$\text{Interior angle} = \frac{180°(n-2)}{n}$	n = number of sides
Measure of One Exterior Angle of a Regular Polygon	$\text{Exterior angle} = \frac{360°}{n}$	n = number of sides
Central Angle of Regular Polygons (C)	$C = \frac{360°}{n}$	n = number of sides
Number of Diagonals in a Polygon (D)	$D = \frac{n(n-3)}{2}$	n = number of sides

Additional formulas on next page.

Trigonometric Laws			
Sine Law	$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	Cosine Law	$a^2 = b^2 + c^2 - (2bc \cos A)$ $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

Tax Rates	
Provincial Retail Sales Tax (RST) 7%	Federal Goods and Services Tax (GST) 5%

Taxes on Vehicle Purchases		
	RST	**GST**
Buying New	Yes	Yes
Buying Used from a Dealership	Yes	Yes
Buying Used Privately	Yes, calculated on greater of book value or purchase price	No
Safety	No	Yes
Materials and Labour	Yes	Yes
Lien Search	No	No

Notes:

— Provincial sales tax (PST) is now called retail sales tax (RST).

— Since July 1, 2020, RST is no longer added to home insurance.