Grade 12
Essential Mathematics
Achievement Test

Student Booklet

January 2026

Manitoba

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

Description

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

This test consists of six sections:

Home Finance	13.5
Probability	10
Vehicle Finance	15.5
Geometry and Trigonometry	12
Precision Measurement	9
Statistics	10
Total Possible Marks:	**70**

Directions

- Show all your work and clearly indicate your final answer.
- Use your *Formula Sheet* and your study sheet.
- Use a well-organized method to communicate your answer.
- 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.

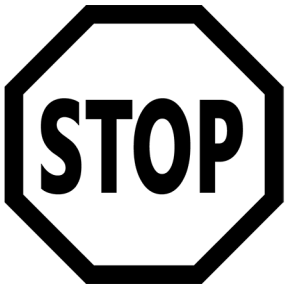
- Some answers are to be given as decimal values. Rounding too early in your solution may result in an inaccurate final answer for which full marks will not be given.
- When no tax calculation is necessary, the wording “taxes included” will be used. When you are required to add taxes, the wording “plus 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 another method that clearly show(s) 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

Home Finance

Question 1

1 mark [101]

Identify which of the following is not a closing cost:

A) Property tax adjustment

B) Landscaping

C) Lawyer's fees

D) Land transfer tax

Answer: _____

Question 2

3 marks

A) Calculate the annual home insurance for the following situation:

- Value of home: $295 000
- Area 2
- Standard policy
- $500 deductible

Use the *Manitoba Homeowner's Insurance Rates* table on the following page. (2 marks)

Show your work.

B) Insurance for the same home in Area 4 costs $1414.40.

Justify why a home in Area 4 has a different insurance cost. (1 mark)

Manitoba Homeowner's Insurance Rates

Manitoba Homeowner's Insurance Rates ($500 deductible)								
	Winnipeg		Area 2		Area 3		Area 4	
Amount	Standard	Comprehensive	Standard	Comprehensive	Standard	Comprehensive	Standard	Comprehensive
$ 50 000	195	214	147	161	196	216	261	287
$ 55 000	216	238	160	176	217	239	289	318
$ 60 000	237	260	173	190	237	261	315	347
$ 65 000	252	277	187	205	255	281	339	373
$ 70 000	266	303	200	220	270	297	359	395
$ 75 000	294	314	210	231	285	314	379	417
$ 80 000	310	323	221	243	302	332	402	438
$ 85 000	318	333	226	249	313	344	416	462
$ 90 000	324	349	231	254	324	356	431	474
$ 95 000	348	370	244	268	345	380	459	505
$100 000	364	393	260	286	361	397	480	528
$105 000	390	417	278	306	378	416	503	553
$110 000	402	441	293	322	393	432	523	575
$115 000	418	464	299	329	409	450	544	598
$120 000	436	487	309	340	424	466	564	620
$125 000	451	510	319	351	444	488	591	650
$130 000	472	543	339	373	466	513	620	682
$135 000	498	557	345	380	477	525	634	697
$140 000	523	580	358	394	496	546	660	726
$145 000	538	596	375	413	508	559	676	744
$150 000	550	604	385	424	520	572	692	761
$155 000	557	613	398	438	551	606	733	806
$160 000	565	622	413	454	569	626	757	833
$165 000	572	629	425	468	589	648	783	861
$170 000	590	647	441	485	609	670	810	891
$175 000	607	668	451	496	624	686	830	913
$180 000	620	686	466	513	648	713	862	948
$185 000	636	702	478	526	667	734	887	976
$190 000	652	717	492	541	705	776	938	1032
$195 000	678	742	504	554	720	792	958	1054
$200 000	692	771	519	571	726	799	966	1063
Additional Amounts per $1000 coverage	Add: $3.15	Add: $3.50	Add: $2.75	Add: $3.03	Add: $3.55	Add: $3.91	Add: $4.72	Add: $5.19

$200 deductible—Increase premium by 10%

Manitoba no longer charges sales tax on home insurance premiums.

Question 3

3.5 marks

Deepak owns a condo worth $275 000. The portioned percent is 45%. The municipal tax rate is 15.758 mills.

A) Calculate Deepak’s municipal tax. (2 marks)

Show your work.

B) Deepak's condo is on a lot with 50 foot frontage. There is a local improvement tax for sidewalk upgrades of $8.50/ft.

Calculate the local improvement tax. (1 mark)

C) Calculate Deepak’s total property tax before deductions if he also pays $1445 in education taxes. (0.5 mark)

Question 4

1.5 marks [107]

Oleksii's mortgage amount of $328 000 has the following amortization schedule.

Calculate the missing values in the schedule for March.

Month	Monthly Mortgage Payment	Interest Payment	Principal Payment	Unpaid Balance
February	$2348.48	$1981.67	$366.81	$327 633.19
March		$1979.45		

Question 5

2 marks [108]

The land transfer tax when purchasing a property is calculated as follows:

Land Transfer Tax Table		
Value of Property	**Rate (%)**	**Tax amount ($)**
On the first $30 000	0%	$0
On the next $60 000 (i.e., $30 001 to $90 000)	0.5%	$300
On the next $60 000 (i.e., $90 001 to $150 000)	1.0%	$600
On the next $50 000 (i.e., $150 001 to $200 000)	1.5%	$750
On amounts in excess of $200 000	2.0%	
	Total	

Shorai is purchasing a property valued at $410 000.

Calculate the total land transfer tax that Shorai has to pay.

Show your work.

Question 6

2.5 marks [109]

Shayd is looking to buy a house with annual property taxes of $3036 and monthly heating costs of $218. Shayd's gross monthly income is $6800 and she anticipates a monthly mortgage payment of $1600.

Calculate Shayd's Gross Debt Service Ratio.

Show your work.

Probability

Question 7

1 mark [110]

The probability of a person's cell phone ringing in a movie theatre is 6%. On Saturday, 580 people attended movies at this theatre.

Determine the number of times a phone rang during a movie on Saturday.

Show your work.

Question 8

1 mark [111]

Dakota is planning to go ice fishing. The odds in favour of a storm occuring are 2:9.

Calculate the probability of a storm occuring the day Dakota goes ice fishing.

Question 9

1 mark [112]

The Tigers have made soccer provincials in five of the last nine years.

State, as a percentage, the probability that they will play in provincials this year.

Question 10

1 mark [113]

The probability of being selected to appear on a television commercial is 5%.

State the odds against being selected for the television commercial.

Question 11

1 mark [114]

Tanisha stated that 1.15 is the probability of Canada winning an Olympic medal.

Explain why Tanisha is incorrect.

Question 12

2 marks

Ten tokens numbered 1 to 10 are placed in a box. Charleigh randomly selects one token, records her results, and then returns it to the box. She does this five times.

The results are:

A) State the experimental probability of Charleigh selecting an 8. (1 mark)

B) State the theoretical probability of Charleigh selecting a 2. (1 mark)

Question 13

3 marks

A fundraiser is selling tickets to win a $795 television. A ticket costs $99. The probability of winning the television is 8%.

A) Calculate the expected value of winning the television. (2 marks)

Show your work.

B) Justify whether you should purchase a ticket, based on your answer from part A. (1 mark)

Vehicle Finance

Question 14

2 marks [119]

Yulia is deciding whether to lease or buy a new truck.

Describe one advantage of each.

Lease: _____

Buy: _____

Question 15

1 mark [120]

Identify the reason why a car must undergo a safety inspection when purchased privately.

A) To have it insured by Manitoba Public Insurance

B) To ensure that it is not a stolen car

C) To make sure there are no other owners of the car

D) To avoid paying for a lien search

Answer: _____

Question 16

1.5 marks [121]

An SUV has a fuel economy of 14 L/100 km in the city and 10.5 L/100 km on the highway.

A person drives this SUV for one month. They travelled 715 km in the city and 1474 km on the highway.

Calculate the total amount of fuel used.

Show your work.

Question 17

2 marks [122]

State two optional features that can be added to the base price when purchasing a new vehicle.

1. _____

2. _____

Question 18

2 marks [123]

Amir wants to buy a new vehicle and he has two options.

Justify which vehicle Amir should choose, based on the values of the vehicles after one year.

Show your work.

	Vehicle 1	Vehicle 2
Purchase price (taxes included)	$31 490	$34 350
Depreciation rate (year 1)	15%	20%

Question 19

4 marks

Fred buys a used truck from a dealership. The price of the vehicle is $37 750 plus taxes. He agrees to trade-in his old vehicle for $6650.

A) Calculate the total cost, plus taxes, that Fred will pay to purchase the vehicle. (2 marks)

Show your work.

B) Fred saved $6000 dollars for a down payment. He will take out a loan for the rest of the amount at an interest rate of 6.5% over 4 years.

Calculate Fred's monthly payment. (2 marks)

Show your work.

Monthly Vehicle Loan Payments
per $1000 borrowed

Interest Rate (%)	Years to Repay Loan				
	1	2	3	4	5
6.00	86.07	44.32	30.42	23.49	19.33
6.25	86.18	44.43	30.54	23.60	19.45
6.50	86.30	44.55	30.65	23.71	19.57
6.75	86.41	44.66	30.76	23.83	19.68
7.00	86.53	44.77	30.88	23.95	19.80

Question 20

1 mark [126]

Identify what residual value refers to when leasing a vehicle.

A) The amount financed for the lease

B) The amount of money put down on the vehicle

C) The charge for exceeding the kilometre usage

D) The value of the vehicle at the end of the lease

Answer: _____

Question 21

2 marks [127]

A mechanic repairs the transmission on a vehicle. He starts working at 8:30 a.m. and finishes at 4:00 p.m. He takes a one-hour unpaid break for lunch. The transmission costs $950 to repair and the labour cost is $123.50/hour.

Calculate the total cost for the repair, plus taxes.

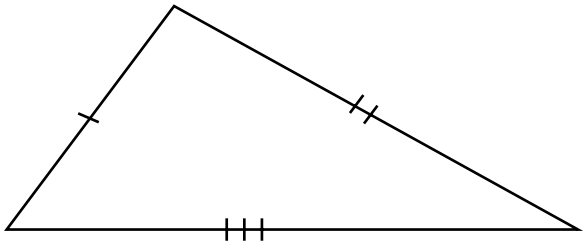
Show your work.

Geometry and Trigonometry

Question 22

1 mark [128]

Identify the type of triangle shown in the diagram below.



A) Scalene

B) Equilateral

C) Isosceles

D) Right

Answer: _____

Question 23

2 marks [129]

Sketch and label all side and angle properties of a right trapezoid.

Question 24

2 marks

A regular polygon has equal exterior angles of 72°.

A) Calculate the number of sides of the regular polygon. (1 mark)

Show your work.

B) Calculate the size of each interior angle in the regular polygon. (1 mark)

Show your work.

Question 25

2 marks [132]

Determine the number of diagonals in a regular nonagon (9-sided polygon).

Show your work.

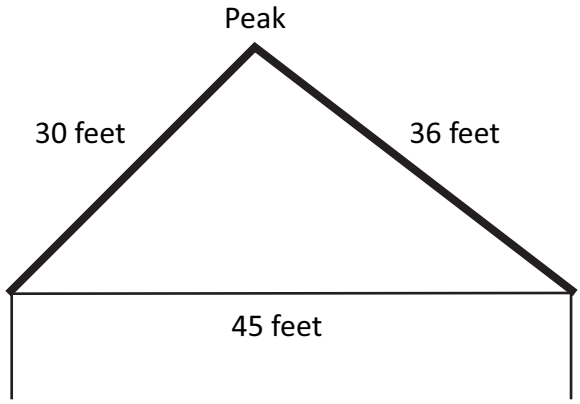
Question 26

2 marks [133]

An architect designed the roof of a chalet to have a span of 45 feet, with slanted sides of 36 feet and 30 feet.

Calculate the measure of the angle of the roof's peak.

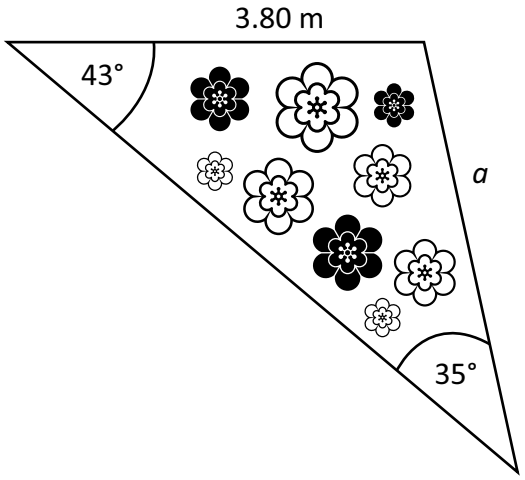
Show your work.



Question 27

2 marks [134]

Nevaeh has a flower bed in the shape of a triangle.



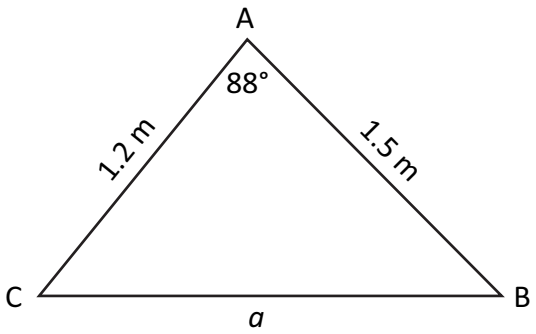
Calculate the length of the missing side, a.

Show your work.

Question 28

1 mark [135]

Identify which formula could be used to determine the length of side a.



A) $a^2 = 1.2^2 + 1.5^2$

B) $a^2 = 1.2^2 + 1.5^2 + 2(1.2)(1.5)\cos 88°$

C) $a^2 = 1.2^2 + 1.5^2 - 2(1.2)(1.5)\cos 88°$

D) $\dfrac{a}{\sin 88°} = \dfrac{1.2}{\sin B}$

Answer: _____

Precision Measurement

Note: Do not round answers in this section.

136
137
138

Question 29

3 marks

A) State the range for the following form of tolerance. (1 mark)

$$35°C$$
$$-10°C$$

B) State the minimum value of $65.8\ \text{mm}^{+4.2\ \text{mm}}_{-1.3\ \text{mm}}$. (1 mark)

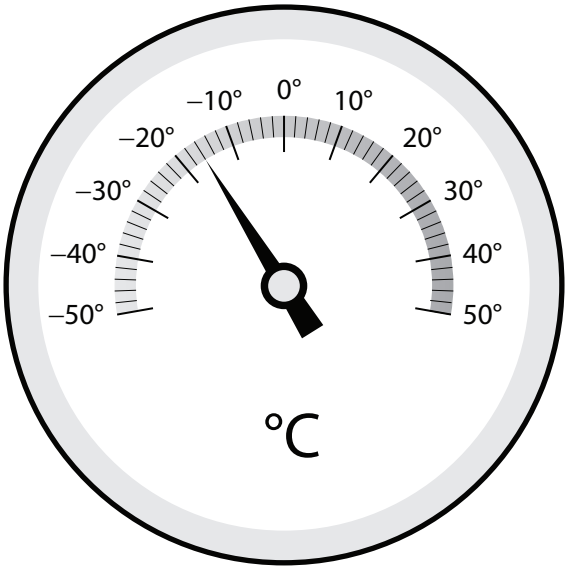
C) State the nominal value of 5321 ft. $\pm$ 250 ft. (1 mark)

Question 30

2 marks [139]

State the temperature shown on the thermometer below in the form:

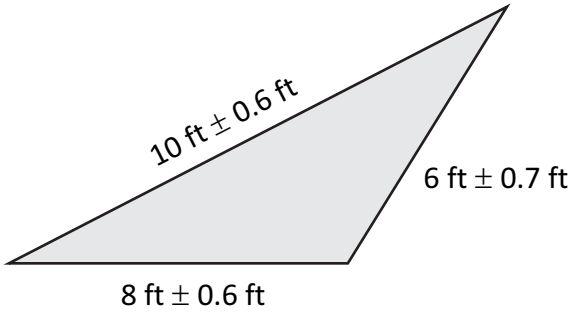
measurement $\pm$ uncertainty



Question 31

2 marks [140]

A garden is being fenced as shown below.



Calculate the maximum length of fencing required given the measurements and the uncertainties above.

Show your work.

Question 32

1 mark [141]

Three of the four forms of tolerance listed below indicate the same measurement in litres.

Identify the form of tolerance that indicates a different measurement.

A) $5.1\ \text{L}\ ^{+4.4\ \text{L}}_{-4.4\ \text{L}}$

B) $9.5\ \text{L} \pm 4.4\ \text{L}$

C) $13.9\ \text{L}$
$5.1\ \text{L}$

D) $5.1\ \text{L}\ ^{+8.8\ \text{L}}_{-0}$

Answer: _____

Question 33

1 mark [142]

Explain why the concept of tolerance is important when installing a door.

143
144

Question 34

2 marks

Ten students were asked to calculate the distance in kilometers they travelled one-way to school. The data is listed below.

0.2	0.8	1.1	1.5	1.8	3.9	4.8	5.0	5.2	5.2

A) Determine the median distance travelled. (1 mark)

Show your work.

B) State the mode. (1 mark)

Question 35

3 marks

Kenyi is in a food competition and is asked to create three dishes. Their points for each round are recorded below.

The first and second rounds are worth 30% each and the third round is worth 40%.

Round	Points	Weight
Round One	16	30%
Round Two	17	30%
Round Three	18.5	40%

A) Calculate Kenyi's weighted mean. (2 marks)

Show your work.

B) Contestants win a prize if their weighted mean is at least 18 points.

Justify whether Kenyi will win a prize. (1 mark)

Question 36

2 marks [147]

Niimi is a soap stone carver and sells his work in Northern Manitoba. The number of hours he spent on each carving is given below.

10.5	12	14	13	9	21	12	7	15

Calculate the trimmed mean of the hours Niimi spent on a soap stone carving by removing the highest and lowest hours spent.

Show your work.

Question 37

1 mark [148]

The scores from a recent math quiz are given below.

Score	Number of Students
8	3
10	6
10.5	5
11	8
12	5

Asmee incorrectly calculated the weighted mean on the quiz and their work is recorded:

$$\text{Weighted Mean} = \frac{8 + 10 + 10.5 + 11 + 12}{5}$$

$$= 10.3$$

Describe an error Asmee made in their work.

Question 38

2 marks [149]

Sarjit was one of 130 people who completed a mortgage broker course. There were 76 students who scored lower than her.

Calculate Sarjit's percentile rank.

Show your work.

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 ($GDSR$)	$GDSR = \frac{\left(\begin{matrix}\text{Monthly}\\\text{mortgage}\\\text{payment}\end{matrix} + \begin{matrix}\text{Monthly}\\\text{property}\\\text{taxes}\end{matrix} + \begin{matrix}\text{Monthly}\\\text{heating}\\\text{costs}\end{matrix}\right)}{\text{Gross monthly income}} \times 100$	
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

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

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