Mental Math

Grade 12 Essential Mathematics

Manitoba

Mental Math

Grade 12 Essential Mathematics

2017

Manitoba Education and Training

Manitoba Education and Training Cataloguing in Publication Data

Mental math : grade 12 essential mathematics

ISBN: 978-0-7711-8029-3 (print)
ISBN: 978-0-7711-8030-9 (pdf)

1. Mathematics—Study and teaching (Secondary)—Manitoba.
2. Mental arithmetic—Study and teaching (Secondary)—Manitoba.
I. Manitoba. Manitoba Education and Training.
510.712

Manitoba Education and Training
Winnipeg, Manitoba, Canada

Print copies of this resource (stock number 80738) can be purchased from the Manitoba Learning Resource Centre. Order online at www.manitobalrc.ca.

This resource is also available on the Manitoba Education and Training website at www.edu.gov.mb.ca/k12/cur/math/supports.html.

Disponible en français.

Contents

Acknowledgements

Manitoba Education and Training gratefully acknowledges the contributions of the following individuals in the development of *Mental Math: Grade 12 Essential Mathematics.*

Writer	Michelle Levesque	Independent Consultant Winnipeg
Manitoba Education and Training	Louise Boissonneault Coordinator	Document Production Services Unit Educational Resources Branch
	Wenda Dickens Coordinator	Development Unit Instruction, Curriculum and Assessment Branch
	Ian Donnelly Project Leader	Development Unit Instruction, Curriculum and Assessment Branch
	Lynn Harrison Desktop Publisher	Document Production Services Unit Educational Resources Branch
	Grant Moore Publications Editor	Document Production Services Unit Educational Resources Branch

Introduction

Introduction

Mental Math: Grade 12 Essential Mathematics is a complement to the Grade 12 Essential Mathematics curriculum and is intended to help students develop strategies that allow them to perform mental calculations.

Why Mental Mathematics?

Mental mathematics and estimation is one of the seven processes of the mathematics curriculum.

> Mental mathematics and estimation is a combination of cognitive strategies that enhance flexible thinking and number sense. It involves using strategies to perform mental calculations.
>
> Mental mathematics enables students to determine answers without paper and pencil. It improves computational fluency by developing efficiency, accuracy, and flexibility in reasoning and calculating.*

It is used by individuals in their daily lives at home and at work. Mental calculation requires students to call on their knowledge of numbers and mathematical operations. It not only calls on memory but helps improve it as well.

Mental calculation is at the root of the estimation process. It allows us to determine whether results obtained with a calculator are reasonable.

> Estimation is used for determining approximate values or quantities, usually by referring to benchmarks or referents, or for determining the reasonableness of calculated values. Estimation is also used to make mathematical judgments and to develop useful, efficient strategies for dealing with situations in daily life.*

Mental calculation is an important way of developing number sense and acquiring a better understanding of place value and mathematical operations. Students who have experience with mental math develop the ability to work with numbers. Mental calculation can be used to prepare for written work by providing an approximate answer to a problem. Using certain mental calculation strategies can eliminate some steps in written calculations and help simplify the process. In short, mental calculation skills are at the heart of numeracy.

---

* Manitoba Education and Advanced Learning. *Grades 9 to 12 Mathematics: Manitoba Curriculum Framework of Outcomes, 2014* (Winnipeg, MB: Manitoba Education and Advanced Learning, 2014) 9.

Mental calculation is used almost daily in life. We often have to do quick mental calculations at times when we do not have paper, a pencil, or a calculator handy. Mental calculation is therefore a very practical skill. Teachers should provide opportunities for their students to use mental math and estimation on a daily basis. They should encourage their students to find examples of the usefulness of mental calculation in their lives, such as when shopping, doing home renovations, estimating mileage, or working at their jobs.

Strategies

Teachers should promote a variety of mental mathematics strategies. They are encouraged to make students aware of the strategies described in the Strategies section of this document. The strategies that are most effective for mental calculation are often not the same strategies that are most effective for written calculation. Most students are able to develop strong mental calculation techniques, but often need help in doing so. Students may discover and use some mental calculation techniques by themselves but need to be taught other techniques to increase their mental calculation effectiveness. Regular mental calculation activities should be included in all mathematics curricula at all grade levels.

Document Features

The document includes three main sections: this introduction, a section describing strategies, and a series of mental mathematics questions organized by units.

The teacher will find mental mathematics questions relating to a specific substrand of Grade 12 Essential Mathematics as written in *Grades 9 to 12 Mathematics: Manitoba Curriculum Framework of Outcomes*. The *Mental Math: Grade 12 Essential Mathematics* document consists of seven (7) units related to specific substrands and one unit with a review of all substrands. Note that there are no mental math questions developed for the Career Life substrand.

Unit	Number of Pages
A: Home Finance	9
B: Geometry and Trigonometry	6
C: Business Finance	3
D: Probability	4
E: Vehicle Finance	6
F: Statistics	5
G: Precision Measurement	5
H: Review (All Units)	14

The units may be taught in a different order as determined by the teacher. Every unit consists of several pages of mental math questions.

The unit of study is identified on each page. The questions on each page are divided into three different categories: five (5) general or review questions; three (3) questions related to the unit of study; and two (2) blanks for teachers to insert their own questions.

The answers to the questions are provided in the column on the extreme right-hand side of each page. Sometimes students are asked to provide the one right answer and at other times they are to provide an estimate where a range of values would be correct.

Teachers may want to prepare additional questions to better meet the needs of their students. A section at the bottom of each page entitled Other Questions has been set aside for this purpose. A blank template is also provided in a section titled Reproducible Sheets. Teachers may use it to prepare additional question sheets.

A file in Word format is available in the Mathematics Group on the Maple (Manitoba Professional Learning Environment) site at www.mapleforem.ca. The Word file does not contain the Strategies section of this document but it does contain the section with the Mental Math Questions by Unit. It is provided to enable teachers to add or modify questions to suit the needs of their students.

Immediately following this introduction is a section describing mental calculation strategies along with examples. Some students may already have an inventory of strategies that they can apply; others may not. Teachers can use the strategies information given in this document to help students expand their strategy knowledge.

Methodology

Given their usefulness, mental calculation exercises should be short and done frequently.

They should be short because they require sustained concentration. For example, the first five minutes or so of math class could be devoted to mental calculation exercises. This practice would also serve as a warm-up to the day's lesson. Alternatively, the mental math practice could be done at the end of a class as a wrap-up to the day's lesson. In addition, although mental calculation should be done within a certain period of time, it is preferable not to emphasize speed. Although speed is a factor, it is not a primary goal. It is obviously important to ensure that time spent on mental mathematics activities does not infringe on the time needed for instruction and other learning activities.

Establishing routines in the classroom also encourages students to get to work quickly at the beginning of each class or to continue to work through to the end of each class. Teachers could establish a process such as the following:

- As soon as students arrive at the beginning of the class (or when instructed near the end of the class), they can take out a sheet of paper and write down the numbers 1 to 10 if there are 10 questions.
- The teacher can project a mental math page, present questions orally, or distribute a page with written questions.
- The students are given time to answer the questions.
- If students are unable to find an answer to a specific question, they could leave an empty space on that question and go on to the next question. The goal is accuracy and the development of a bank of effective strategies.
- The teacher should, on occasion, spend time discussing various strategies used by the students for one or more of the questions.

To ensure students gain confidence with a new strategy, it is important that they are given adequate opportunity to practise it. It is up to the teacher to provide an adequate number of exercises or problems to ensure that students are able to use the new strategies.

Assessment

Primarily, mental calculation exercises are used as assessment *for* learning. Mental calculation exercises should be done in a classroom environment in which students feel comfortable taking risks without being penalized when they make mistakes. However, teachers should ask students to do a self-evaluation by identifying the questions they had the most difficulty with or those they did not answer correctly. Periodically, teachers may choose to use the mental mathematics questions as assessment *of* learning by asking students to explain the strategy they used for a specific question or questions.

Mental calculation can allow students an opportunity to develop a better understanding of some mathematical concepts. Consequently, mental calculation activities should include periods for thought and discussion. During these periods, the teacher should encourage students to

- suggest a variety of possible solutions to the same problem
- explain the different methods used to come to the correct answer and their effectiveness
- explain the thought process that led to an incorrect answer

This type of discussion is very important in learning mental calculation strategies, because it is an effective way for students to present their thinking. Questioning, reflecting, and discussing, which are integral to the activities of mental calculation, are excellent ways of communicating mathematical ideas. This communication requires that students be clear and concise when explaining their thinking to others. It is often when students describe the strategy they used to solve questions that other students discover a new technique. These exchanges about the strategies as well as the results will allow the teacher to identify the difficulties encountered by some students. Subsequently, the teacher can help students discover new, relevant, useful, and important strategies.

Enjoy the mental mathematics experience!

Notes

Reproducible Sheets

Mental Math

Grade 12 Essential Mathematics (40S)

Unit:

General Questions	Answers
1.	
2.	
3.	
4.	
5.	
Unit Questions	
6.	
7.	
8.	
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

Unit:

General or Unit Questions	Answers
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
Other Questions	
11.	
12.	

Examples of Strategies

Mental Math

Grade 12 Essential Mathematics (40S)

S–1

Sample Strategies

Begin adding from the left

When you do additions using paper and pencil, you usually start from the right and work toward the left.

To do additions in your head, start from the left.

EXAMPLE 1

$$\begin{array}{r} 46 \\ +\ 38 \\ \hline \end{array}$$

40 + 30 = 70

6 + 8 = 14

70 + 14 = 84

EXAMPLE 2

$$\begin{array}{r} 25.6 \\ +\ 13.7 \\ \hline \end{array}$$

20 + 10 = 30

5 + 3 = 8

$\frac{6}{10} + \frac{7}{10} = 1$ and $\frac{3}{10}$

$30 + 8 + 1\frac{3}{10} = 39.3$

Mental Math

Grade 12 Essential Mathematics (40S)

S–2

Sample Strategies

Break down numbers and add their parts

Here's another way of doing additions in your head.

$$\begin{array}{r} 63 \\ +28 \\ \hline \end{array}$$

Break down the numbers, then add their parts.

EXAMPLE 1

$$\begin{array}{r} 63 \\ +\ 28 \\ \hline \end{array}$$

63 + 20 + 8

83 + 8

91

EXAMPLE 2

$$\begin{array}{r} 315 \\ +\ 276 \\ \hline \end{array}$$

315 + 200 + 70 + 6

515 + 70 + 6

585 + 6

591

Mental Math

Grade 12 Essential Mathematics (40S)

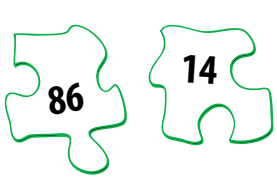
S–3

Sample Strategies

Finding compatible numbers

Compatible numbers are pairs of numbers that are easy to add in your head.

The following are examples of compatible numbers:

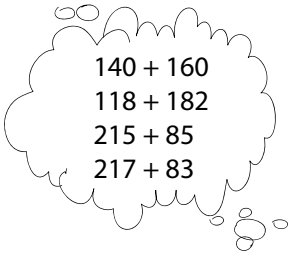


The sum equals 100.

The sum equals 600.

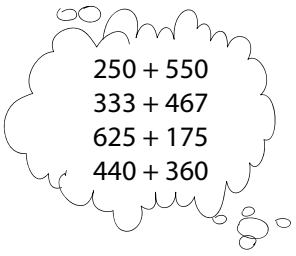
Find the pairs of compatible numbers that add up to 300.

140	85	160
118	217	73
215	182	83



Find the pairs of compatible numbers that add up to 800.

250	175	567
333	440	467
625	550	360



Mental Math

Grade 12 Essential Mathematics (40S)

Sample Strategies

S–4

Create your own compatible numbers

Sometimes it is easier to do additions in your head by creating your own compatible numbers and adjusting the total.

EXAMPLE 1

$$\begin{array}{r} 650 \\ +\ 375 \\ \hline \end{array}$$

650 + 350 + 25

1000 + 25

1025

EXAMPLE 2

$$\begin{array}{r} 1250 \\ +\ 753 \\ \hline \end{array}$$

1250 + 750 + 3

2000 + 3

2003

Mental Math

Grade 12 Essential Mathematics (40S)

S–5

Sample Strategies

Subtract starting from the left

Here's a technique that works well when doing subtractions that do not require grouping.

To do subtractions in your head, start from the left and think of your answer one part at a time.

EXAMPLE 1

$$\begin{array}{r} 468 \\ -\ 323 \\ \hline \end{array}$$

400 – 300 = 100

60 – 20 = 40

8 – 3 = 5

100 + 40 + 5 = 145

EXAMPLE 2

$$\begin{array}{r} 9514 \\ -\ 6203 \\ \hline \end{array}$$

9000 – 6000 = 3000

500 – 200 = 300

14 – 3 = 11

3000 + 300 + 11 = 3311

Mental Math

Grade 12 Essential Mathematics (40S)

S–6

Sample Strategies

Subtract one part at a time

When you do a subtraction that requires a grouping, subtract one part at a time.

EXAMPLE 1

$$\begin{array}{r} 132 \\ -\ 59 \\ \hline \end{array}$$

132 – 50 = 82

82 – 9 = 73

Check your answer by adding the following in your head:
73 + 59 = 120 + 12 = 132

EXAMPLE 2

$$\begin{array}{r} 6.25 \\ -\ 3.15 \\ \hline \end{array}$$

6.25 – 3 = 3.25

3.25 – 0.15 = 3.10

Don't forget to check your answer doing a mental addition.

Mental Math

Grade 12 Essential Mathematics (40S)

S–7

Sample Strategies

Balance a subtraction with whole numbers

When you add the same number to the two elements of a subtraction, the difference between the two does not change.

By adding to both elements, you balance the subtraction.

That makes it easier to find the answer in your head.

EXAMPLE 1

$$\begin{array}{r} 76 \\ -\ 28 \\ \hline \end{array}$$

76 + 2 = 78

28 + 2 = 30

78 – 30 = 48

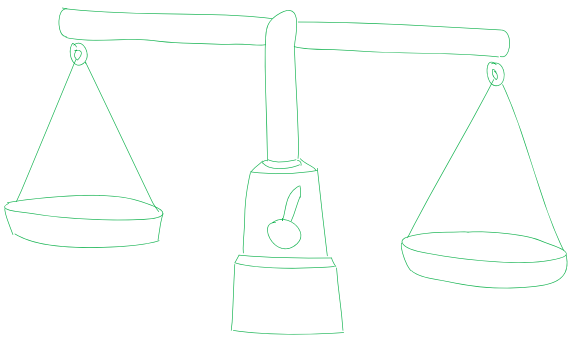
EXAMPLE 2

$$\begin{array}{r} 660 \\ -\ 185 \\ \hline \end{array}$$

660 + 15 = 675

185 + 15 = 200

675 – 200 = 475



Mental Math

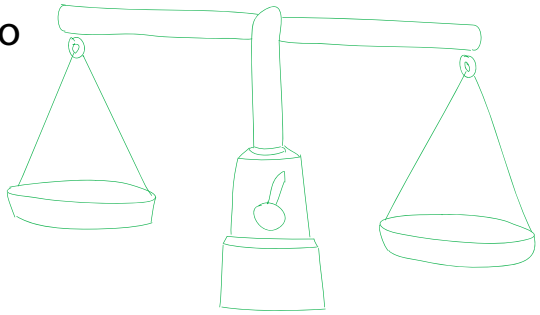
Grade 12 Essential Mathematics (40S)

S–8

Sample Strategies

Balance a subtraction with decimal numbers

When you add the same number to the two elements of a subtraction, the difference between the two does not change.



Adding to both elements balances the subtraction.

That makes it easier to find the answer in your head.

EXAMPLE 1

$$\begin{array}{r} 4.32 \\ -\ 1.95 \\ \hline \end{array}$$

4.32 + 0.05 = 4.37

1.95 + 0.05 = 2

4.37 – 2 = 2.37

EXAMPLE 2

$$\begin{array}{r} 23.62 \\ -\ 15.89 \\ \hline \end{array}$$

23.62 + 0.11 = 23.73

15.89 + 0.11 = 16

23.73 – 16 = 7.73

Remember that you have to make sure the second element (not the first) becomes a number that is easy to subtract.

Mental Math

Grade 12 Essential Mathematics (40S)

S–9

Sample Strategies

Multiply starting from the left

It is easier to multiply in your head when you break down a number and multiply starting from the left.

Add in your head as you multiply each part.

EXAMPLE 1

$$\begin{array}{r} 635 \\ \times\ \ 4 \\ \hline \end{array}$$

600 × 4 = 2400

30 × 4 = 120

5 × 4 = 20

2400 + 120 + 20 = 2540

EXAMPLE 2

$$\begin{array}{r} 528 \\ \times\ \ 3 \\ \hline \end{array}$$

500 × 3 = 1500

20 × 3 = 60

8 × 3 = 24

1500 + 60 + 24 = 1584

Mental Math

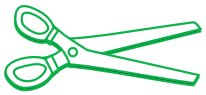
Grade 12 Essential Mathematics (40S)

Sample Strategies

S–10

Cut and paste the zeros

In multiplication, when one factor is multiplied by 10, the result is also multiplied by 10.



$$\begin{array}{r} 6 \\ \times\ 4 \\ \hline 24 \end{array} \quad \xrightarrow{\times 10} \quad \begin{array}{r} 60 \\ \times\ 4 \\ \hline 240 \end{array}$$

Knowing this concept, you can easily multiply by 10 in your head by following these steps:

1. Cut all the zeros at the end.
2. Multiply the remaining numbers.
3. Paste all the zeros back.

EXAMPLE 1

$$\begin{array}{r} 13 \\ \times\ 70 \\ \hline \end{array}$$

$13 \times 7 = 91$

910

EXAMPLE 2

$$\begin{array}{r} 6000 \\ \times\ 1200 \\ \hline \end{array}$$

$6 \times 12 = 72$

$7{,}200{,}000$

Mental Math

Grade 12 Essential Mathematics (40S)

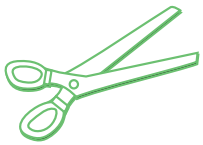
Sample Strategies

S–11

Cut and paste the zeros

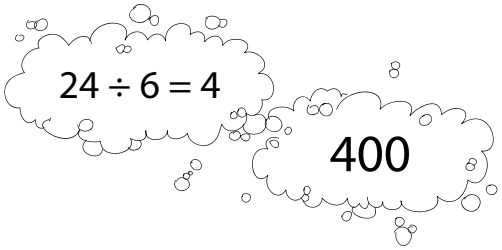
To mentally divide numbers that end in zero, follow these steps:

1. Cut all the zeros at the end.
2. Do the division.
3. Paste the zeros back.



EXAMPLE 1

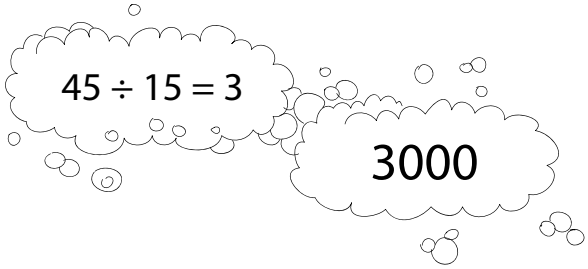
$$2400 \div 6$$



Check the answer by multiplying: $6 \times 400 = 2400$

EXAMPLE 2

$$45{,}000 \div 15$$



Check: $15 \times 3000 = 45{,}000$

Mental Math

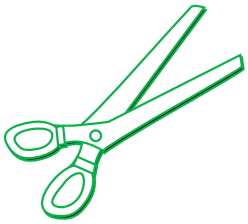
Grade 12 Essential Mathematics (40S)

S–12

Sample Strategies

Cut the zeros in dividend and divisor

When dividing the dividend and divisor in a division by the same amount, the quotient does not change.



$$\begin{array}{r} 800 \\ \div\ 20 \\ \hline \end{array} \Rightarrow \begin{array}{r} 80\,\cancel{0} \\ \div\ 2\,\cancel{0} \\ \hline \end{array} \Rightarrow 40$$

Knowing this concept will help you do the division in your head more easily when the dividend and the divisor both end in zero.

All you have to do is divide both the dividend and divisor by the same value, 10.

EXAMPLE 1

$$\begin{array}{r} 6300 \\ \div\ 90 \\ \hline \end{array}$$

630 ÷ 9

70

EXAMPLE 2

$$\begin{array}{r} 4{,}500{,}000 \\ \div\ 500 \\ \hline \end{array}$$

45,000 ÷ 5

9000

Mental Math

Grade 12 Essential Mathematics (40S)

S–13

Sample Strategies

Work with prices

The sale price of items is often a little less than an even number of dollars.

To work with prices in your head, round off to the nearest dollar. Then, do the calculation required by the problem and adjust your answer.

EXAMPLE 1

$$\begin{array}{r} \$16.65 \\ +\ \$2.99 \\ \hline \end{array}$$

$16.65 + $3 = $19.65

$19.65 – 1¢ = $19.64

EXAMPLE 2

$$\begin{array}{r} \$19.98 \\ \times\quad 6 \\ \hline \end{array}$$

6 × $20 = $120

6 × 2¢ = 12¢

$120 – 12¢ = $119.88

Mental Math

Grade 12 Essential Mathematics (40S)

Sample Strategies

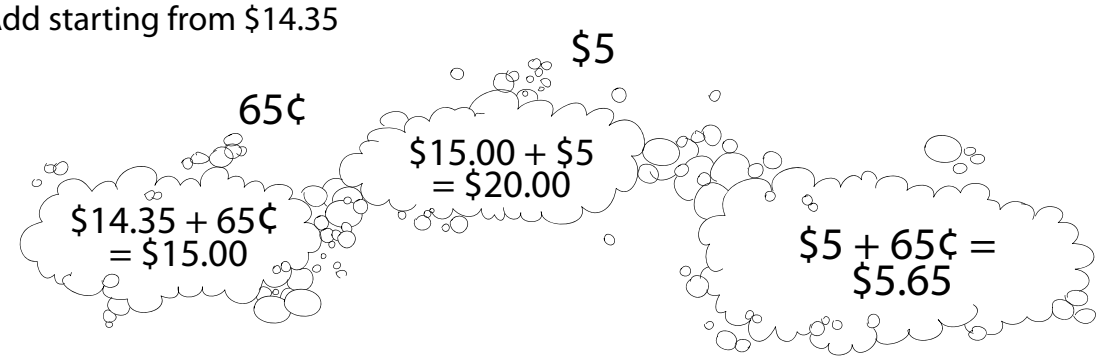
Check your change

When you buy something, it is important to check that the amount of change returned to you is correct.

There is an easier way than subtracting in your head: **add to the purchase price**.

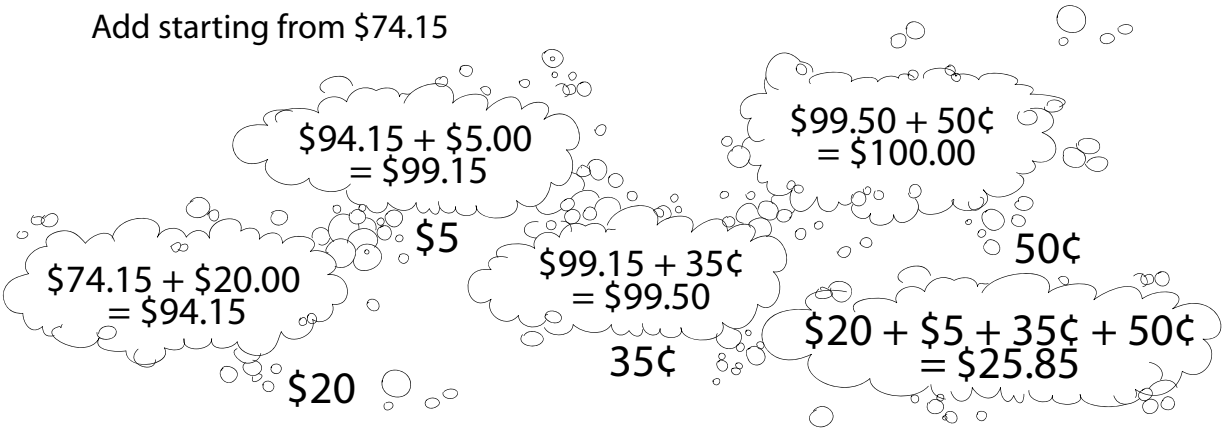
EXAMPLE 1 You buy a CD for $14.35 with a $20 bill. How much change should you get back?

Add starting from $14.35



EXAMPLE 2 You buy a watch for $74.15 with a $100 bill. How much change should you get back?

Add starting from $74.15



Mental Math

Grade 12 Essential Mathematics (40S)

Sample Strategies

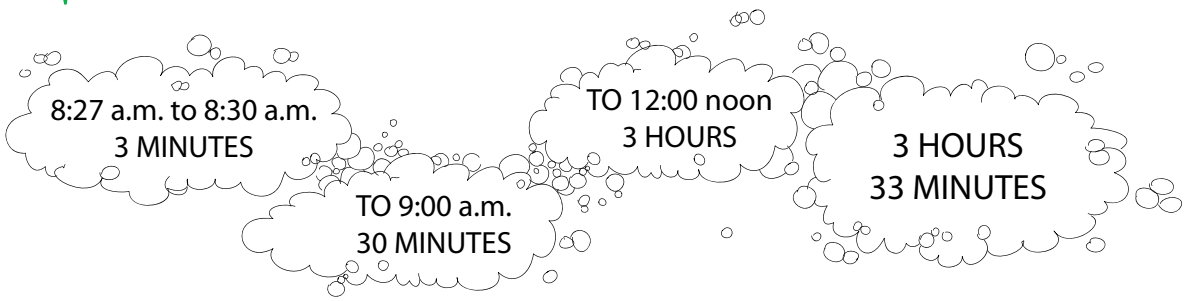
S–15

Find the time difference

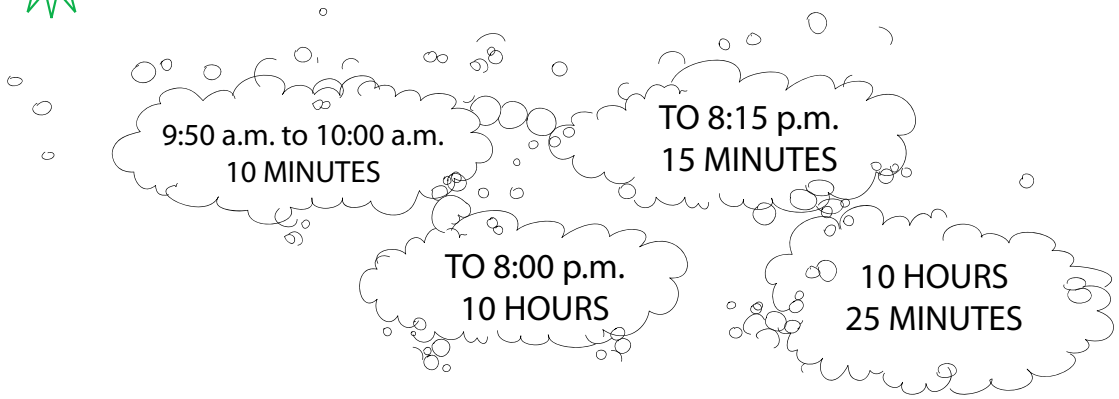
Mental math calculation is useful to find how much time is left before an event.

To find the difference between two given times, add by steps.

EXAMPLE 1 If it is 8:27 a.m., how long do you have to wait before lunch at noon?



EXAMPLE 2 If it is 9:50 a.m., how much time is there before 8:15 p.m.?



Mental Math

Grade 12 Essential Mathematics (40S)

S–16

Sample Strategies

Change quarter fractions to a decimal or a percent

When converting quarters, you can think of the context of money where 1 dollar is the whole and the fractions are the number of coins called "quarters." The fraction, $\frac{3}{4}$, is read, "three quarters." The value of three quarters is \$0.75, which is $\frac{3}{4}$ of a dollar or 75% of a dollar. Similarly, you can do these conversions by thinking of the context of money:

$\frac{1}{4}$ = one quarter = 0.25 = 25%

$\frac{2}{4}$ = two quarters = 0.50 or 50%

$\frac{4}{4}$ = four quarters = 1.00 = 100%

$\frac{5}{4}$ = five quarters = 1.25 or 125%

You can also think of the context of dollars when dividing by quarters.

EXAMPLE 1

$\frac{3}{0.25} = 12$

Think of 3 dollars divided into a group of quarters. There are 12.

EXAMPLE 2

$\frac{5}{0.25} = 20$ or $5 \div \frac{1}{4} = 20$

Think of 5 dollars divided into a group of quarters. There are 20.

Another context that can be useful is time on a clock. Thinking of quarters can help you change fractions of an hour to minutes in time questions where the whole is 1 hour. There are 60 minutes in one hour and $60 \div 4 = 15$. Therefore, one-quarter of an hour is 15 minutes.

$\frac{1}{4}$ = one-quarter of an hour = 15 minutes

$\frac{3}{4}$ = three-quarters of an hour = 45 minutes

$\frac{2}{4}$ = two-quarters of an hour = half an hour = 30 minutes

EXAMPLE 3

Write 2 h, 15 min. in units of hours.

15 minutes is a quarter of an hour. It is equal to 2.25 hours.

EXAMPLE 4

Write 4.75 hours as hours and minutes.

0.75 is the same as three-quarters and three-quarters of an hour is 45 minutes. It is equal to 4 h, 45 min.

Mental Math Questions by Unit

Grade 12 Essential Mathematics

Mental Math

Grade 12 Essential Mathematics (40S)

A–1

Unit A: Home Finance **Specific Learning Outcome: 12.E6.H.1**

General Questions	Answers
1. Write $2\frac{1}{4}$ as an improper fraction.	$\frac{9}{4}$
2. What number satisfies the following equation? $\frac{x}{6} = \frac{12}{24}$	$x = 3$
3. Complete the pattern: 2, 4, 8, 16, _____ , _____	32, 64
4. 1% of \$200 is \$2. What is 0.5% of \$200?	\$1
5. You need to buy a new microwave for your house. The microwave you want costs \$220 with taxes. If you can set aside \$50 a week, how many weeks will it take before you can afford the microwave?	5 weeks
Unit Questions	
6. Aidan wants to buy a house worth \$300,000. He needs to have a down payment of 20% of the purchase price of the house. How much is the down payment?	\$60,000
7. Helga wants to buy a \$180,000 house in 3 years. She needs a \$36,000 down payment. How much does she need to save each month to reach this goal?	\$1000 per month
8. Kieran makes \$2500 a month, Dallas makes \$1700 a month, and Betty makes \$1900 a month. How much money do they make altogether?	\$6100 per month
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

A–2

Unit A: Home Finance **Specific Learning Outcome: 12.E6.H.1**

General Questions	Answers
1. Evaluate the expression for $z = -1$: $3z - (-7)$	4
2. How much tax would you have to pay on an item that costs $49.99 (approximately) if the PST = 7% and the GST = 5%?	$6
3. Since 10% of 200 is 20, what is 35% of 200?	70
4. Evaluate: $\left(\frac{8}{16}\right) \times 12$	6
5. You have to buy a new toaster for your house. The toaster you want to buy costs $54.45, including tax. If you give the cashier $60, how much change should you get back?	$5.55
Unit Questions	
6. Skyler has a monthly mortgage payment of $862. Her property taxes are $187 per month and her heating bill is $120 per month. How much are these expenses altogether?	$1169
7. Barinder's property taxes are $1924 annually (yearly). He gets an Education Property Tax Credit of $700. How much does Barinder pay in property taxes each month?	$102 per month
8. Olaf's gross income is $48,000 annually. How much is his monthly gross income?	$4000
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

A–3

Unit A: Home Finance **Specific Learning Outcome: 12.E6.H.1**

General Questions	Answers
1. Evaluate: $\left(\frac{3}{7}\right)\left(\frac{14}{3}\right)$	2
2. You are furnishing your new apartment with a budget of $2800. You have already bought a couch for $925, table and chairs for $750, and a stove for $1075. How much money do you have left in your budget to buy a refrigerator? Is this reasonable?	$50 No, it is not reasonable.
3. Write two equivalent fractions for $\frac{17}{34}$.	$\frac{1}{2}$, $\frac{2}{4}$, and $\frac{34}{68}$
4. Josiah and his family go out for dinner and their restaurant bill is $126. If they want to leave a 15% tip, how much should they leave?	$18.90
5. You are approved for a $219,000 mortgage from your bank. If you have saved up an additional $16,000 for a down payment, how much can you afford to spend on a house?	$235,000
Unit Questions	
6. Samir bought land for $80,000. He pays a land transfer tax of $0 on the first $30,000 and 0.5% on the amount between $30,000 and $90,000. How much in dollars does he pay for the land transfer tax?	$250
7. Adewale bought a house on June 1. He will have to pay $2000 in property taxes on or before October 1 of the same year. How much should Adewale save each month to pay his property taxes on time?	$500 per month
8. The Lucado family bought a house. They paid $350 for a house inspection, $40 for an appraisal fee, $60 for their mortgage application, $650 for the lawyer and other miscellaneous fees, $75 to hook up a phone, Internet, and cable, and $425 for the moving company. How much did they spend on these miscellaneous moving costs?	$1600
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

A–4

Unit A: Home Finance **Specific Learning Outcome: 12.E6.H.1**

General Questions	Answers
1. Tyla purchases a home for $207,000 with no down payment. She has calculated that she will spend $278,187 paying for the house during the 25-year amortization period. How much money in interest will she pay during this 25-year period?	$71,187
2. Tyla wants to purchase a television for her new home. One television is on sale for 10% off the purchase price of $750. Another television is on sale for 15% off the purchase price of $800. Which television is the least expensive?	The first television set
3. Solve for g: $2g - 11 = 7$	9
4. Convert this percent to a fraction in lowest terms: 66%	$\frac{33}{50}$
5. Evaluate: $\frac{250\ 000}{1000}$	250
Unit Questions	
6. Akim has a $300,000 mortgage. He will make a monthly payment of $5.00 per $1000. Calculate Akim's monthly mortgage payment.	$1500 per month
7. Joaquin has a $220,000 mortgage. He will make a monthly payment of $4 per $1000. Calculate Joaquin's monthly mortgage payment.	$880 per month
8. Indra has a mortgage for $300,000 over 25 years (or 300 months). She makes mortgage payments of $1200 per month. How much interest will Indra pay on her mortgage?	$60,000
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

A–5

Unit A: Home Finance **Specific Learning Outcome: 12.E6.H.1**

General Questions	Answers
1. Sharlee is covered for 70% of the replacement cost of the contents in her home. If the contents of her home are worth $150,000, how much money will Sharlee receive in the event of a house fire?	$105,000
2. Evaluate for $t = 5$: $3t - 8$	7
3. Carly is three times as old as Marla. Marla is one-fourth as old as Pauly. If Pauly is 20, how old are Carly and Marla?	Marla is 5 Carly is 15
4. If 17×18 is 306, what is 17×20?	340
5. Evaluate: $\frac{1}{5} + \frac{2}{3}$	$\frac{13}{15}$
Unit Questions	
6. Niamh's house burned down. Her homeowner's insurance covered $280,000 in replacement costs. Niamh spent $230,000 on building a new home and $70,000 on furniture and other household contents. Niamh had to pay a $500 deductible to the insurance company. In total, how much did Niamh have to pay?	$20,500
7. Bruno has tenant insurance. When his basement flooded, the insurance paid out $12,000. Bruno's costs totalled $13,500 and he had to pay a $200 deductible to the insurance company. How much did Bruno have to pay in total?	$1700
8. Cormac pays an annual rate of $640 for house insurance and $170 for sewage backup insurance. He has a sump pump so he gets a discount of $150. How much is Cormac's monthly house insurance payment?	$55 per month
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

A–6

Unit A: Home Finance **Specific Learning Outcome: 12.E6.H.1**

General Questions	Answers
1. Evaluate: $\frac{3}{5} \times \frac{10}{7}$	$\frac{6}{7}$
2. Cleavon is buying his lunch at a food court in the mall. He spends $4.25 on a slice of pizza, $2.75 on a drink, and $3.50 on a salad. How much does he spend on his lunch?	$10.50
3. Convert the following decimal to a percent: 0.006	0.6%
4. You want to have the following items in your backyard: a shed, a dog run, and a garden. If your backyard is 10 m × 10 m, can you fit a shed that is 4 m × 5 m, a dog run that is 3 m × 10 m, and garden that is 5 m × 5 m?	Yes
5. You are paid $11 per hour. If you work 30 hours this week and 21 hours next week, how much will you be paid for these two weeks?	$561
Unit Questions	
6. The Duval family have a total portioned assessment of $60,000 on their home. The annual municipal rate is 15 mills. Calculate the total annual municipal taxes for the property.	$900
7. The Dhillon family have a total portioned assessment of $50,000 on their home. The annual education rate is 12 mills. Calculate the total annual education taxes for the property.	$600
8. The Smith family have a total portioned assessment of $100,000 on their home. The annual municipal rate is 15 mills. The annual education rate is 17 mills. Calculate the total annual municipal taxes and education taxes for the property.	$3200
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

A–7

Unit A: Home Finance **Specific Learning Outcome: 12.E6.H.1**

General Questions	Answers
1. Melika is on a vacation in Hawaii. She packs clothes that weigh 5.4 kg, toiletries that weigh 2.8 kg, and books that weigh 1.2 kg. If the airport has a limit of 10 kg per carry-on bag, how much extra room does Melika have to bring home souvenirs?	0.6 kg
2. Evaluate: $\frac{3}{7} \times \frac{7}{6}$	$\frac{1}{2}$
3. A canoe is on sale for 35% off the regular price of $300. How much is the canoe on sale for?	$195
4. Find the next two terms in the pattern: 1, 5, 9, 13, _____ , _____	17, 21
5. If 40 DVDs cost $100, how much does each DVD cost?	$2.50
Unit Questions	
6. The Vaarmeyer family has done preventative maintenance on their home for the last 5 years. This includes eavestrough cleaning at $200 per year, changing HVAC filters at $50 a year, and an annual furnace inspection at $120. How much did preventative maintenance cost over the 5-year period?	$1850
7. Carl has a fridge that costs $500 a year in electricity bills. He decides to buy a new fridge, which costs $25 a month in electricity bills. How much money does he save every year?	$200
8. Delilah did not get a furnace inspection this year, which costs $120. A few months later, Delilah's furnace broke and it cost $3000 to replace. The repairwoman told her that if she had the inspection, they could have fixed the faulty part for $500 and she wouldn't have had to replace the furnace. How much more did Delilah pay because of this mistake?	$2380
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

A–8

Unit A: Home Finance **Specific Learning Outcome: 12.E6.H.1**

General Questions	Answers
1. Evaluate: 2^6	64
2. If Myla takes 14 minutes to play one hole of golf, how long will it take her to play 9 holes of golf?	126 minutes
3. Zahra arrived at work at 8:15 a.m. and left work at 6:15 p.m. If Zahra gets paid $10 an hour, and time-and-a-half for any hours worked over 8 hours in one day, how much did Zahra earn this day?	$110.00
4. Write $2\frac{1}{3}$ as an improper fraction.	$\frac{7}{3}$
5. What number satisfies the following equation? $\frac{6}{42} = \frac{x}{7}$	$x = 1$
Unit Questions	
6. Devon decides to buy a new fridge. His old fridge cost him $1200 a year in electricity. His new fridge only costs $45 a month in electricity. How much money will he save each month?	$55 per month
7. Navjot buys a new dishwasher on sale for $1500. The electrical cost of her old dishwasher was $1200 a year but the new dishwasher's electricity costs only $25 a month. How many months will it take Navjot to get her $1500 back? (Hint: Find the monthly savings first.)	20 months
8. Odis buys a new stove and pays $75 a month for 3 years. His old stove costs $50 a month in electricity and his new stove's electricity costs $10 a month. How much more money does Odis spend each month for the next 3 years on the new stove?	$35 per month
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

A–9

Unit A: Home Finance **Specific Learning Outcome: 12.E6.H.1**

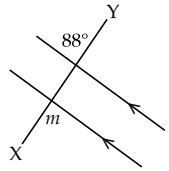
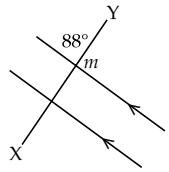
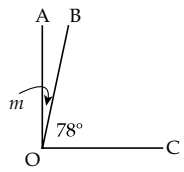
General Questions	Answers
1. Gina realized that she had 3 more quarters in her pocket than she thought she had. If Gina has $7.50 in quarters in her pocket, how many quarters did she originally think she had?	27
2. Leticia worked 20 hours this week and made $220. If she works 15 hours next week at the same pay rate, how much will she earn?	$165
3. If the gas tank in your vehicle holds 30 litres of gasoline and gasoline costs $1.30 a litre, how much will it cost to fill up your vehicle with gasoline?	$39
4. Evaluate: $\frac{1}{4} + \frac{2}{7}$	$\frac{15}{28}$
5. Estimate: 13% of 306	≈ 39 or 40
Unit Questions	
6. Anja has the choice to rent a house for $2500 a month plus $300 in monthly utilities or she can buy a house for $2100 per month. She will also pay $3600 a year in property taxes, $600 a year in house insurance, $600 a year in utilities, and $1200 a year in maintenance. Which option is cheaper and by how much?	Buying is cheaper by $200/month or $2400/year.
7. Samara is a homeowner. The property taxes are $1500 per year, the house insurance is $700 per year, and the maintenance is $150 a month. Samara puts aside $4200 a year for these expenses. How much does she have left over each year?	$200 per year
8. Frank Rockola is renting an apartment. He has $4000 saved for a down payment on a house and he saves a further $400 per month. How many more months will it take Frank to save a total of $10,000?	15 more months
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

B–1

Unit B: Geometry and Trigonometry **Specific Learning Outcome: 12.E6.G.2**

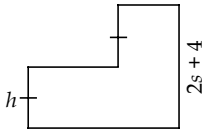
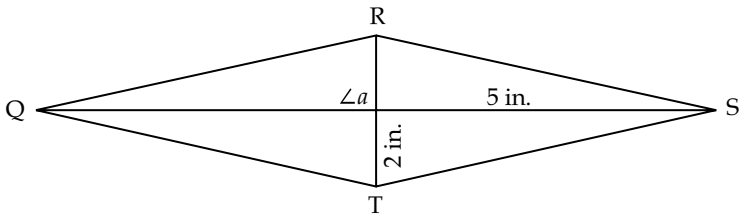
General Questions	Answers
1. If the area of a circle equals 16π m^2, what does the radius of the circle equal?	4
2. $\angle A$ and $\angle B$ are complementary angles. If $\angle A = 62°$, what is the measure of $\angle B$?	$\angle B = 28°$
3. If the perimeter of a square is 20 m, what is the area of the square?	25 m^2
4. Evaluate for $g = -4$: $5g - 13$	-33
5. $\angle C$ and $\angle D$ are supplementary angles. If $\angle C = 62°$, what is the measure of $\angle D$?	$\angle D = 118°$
Unit Questions	
For questions 6 to 8, find the missing angle, m, and state the name for the known and unknown pair of angles. Angle pair names include: ■ complementary angles ■ vertically opposite angles ■ supplementary angles ■ interior alternate angles ■ corresponding angles ■ exterior alternate angles	
6. 	$m = 88°$ exterior alternate angles
7. 	$m = 92°$ supplementary angles
8.  $\angle AOC$ is 90°.	$m = 12°$ complementary angles
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

B–2

Unit B: Geometry and Trigonometry **Specific Learning Outcome: 12.E6.G.2**

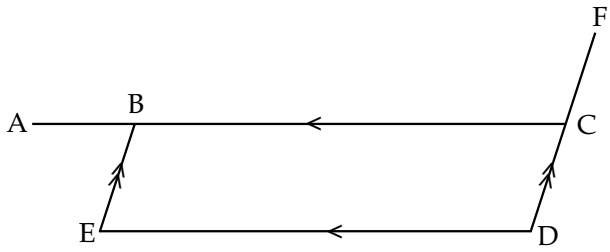
General Questions	Answers
1. $\angle A$, $\angle B$, and $\angle C$ are all angles in a triangle. If $\angle A = 40°$ and $\angle B = 30°$, what is the measure of $\angle C$?	$\angle C = 110°$
2. If $4x - 3x + 8x + 2x = 121$, then $6x - 2 = ?$	64
3. During the Red River Ex, the number of visitors doubled each day. If the Red River Ex opened on Friday with 350 visitors, how many visitors were there on the following Sunday?	1400 visitors
4. Evaluate for $y = 5$: $\left(\frac{30}{y}\right) - 7$	–1
5. How many 15 m^3 containers can you fill with 300 m^3 of sand?	20 containers
Unit Questions	
6. Find the measure of h. 	$h = s + 2$
Use the rhombus below to complete questions 7 and 8. 	
7. What is the length of $\overline{QS}$?	$\overline{QS} = 10$ in.
8. What is the measure of $\angle a$?	$\angle a = 90°$
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

B–3

Unit B: Geometry and Trigonometry **Specific Learning Outcome: 12.E6.G.2**

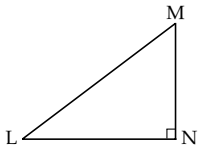
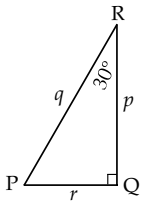
General Questions	Answers
1. ∠A and ∠B are vertically opposite angles. If ∠A = 124°, what is the measurement of ∠B?	∠B = 124°
2. ∠A and ∠B are alternate interior angles. If ∠A = 172°, what is the measurement of ∠B?	∠B = 172°
3. Sam's age is 125% of Jacob's age. If Jacob is 20, what is Sam's age?	25 years old
4. The perimeter of a rectangle with sides a, b, c, and d is 40 m. If sides a and c are 16 m long, what are the lengths of sides b and d?	4 m
5. What is the radius of a circle with an area of 36π m^2?	6 m
Unit Questions	
Use the parallelogram below to answer questions 6 to 8. 	
6. $\overline{AB}$ is 2 cm. $\overline{ED}$ is 3.5 cm. What is the measurement of $\overline{AC}$?	$\overline{AC}$ = 5.5 cm
7. ∠ABE is 72°. What other angles measure 72°?	∠BED ∠BCD
8. ∠ABE is 72°. What is the measurement of ∠EBC?	∠EBC = 108°
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

B–4

Unit B: Geometry and Trigonometry **Specific Learning Outcome: 12.E6.G.1**

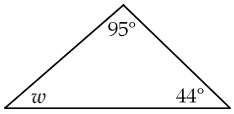
General Questions	Answers
1. ∠A and ∠B are consecutive angles in a parallelogram. If ∠B = 37°, what is the measurement of ∠A?	∠A = 143°
2. ∠A and ∠B are both base angles in an isosceles trapezoid. If ∠A = 57°, what is the measurement of ∠B?	∠B = 57°
3. A Manitoba yoga centre distributes 42 yoga mats for each yoga session. After 6 yoga sessions, how many mats have they distributed?	252
4. How many sides does a hexagon have?	6 sides
5. If 12 × 16 = 192, what is 14 × 16?	224
Unit Questions	
6. A regular decagon has 10 equal angles with the sum of all angles being 1440°. What is the measurement of each angle?	144°
7. If ∠MLN is 37°, what is the measurement of ∠LMN? 	∠LMN = 53°
8. The hypotenuse of right triangle PQR is 80 cm. ∠R = 30° and $\sin 30° = \frac{1}{2}$. Solve for r. 	r = 40 cm
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

B–5

Unit B: Geometry and Trigonometry **Specific Learning Outcome: 12.E6.G.1**

General Questions	Answers
1. $\angle A$, $\angle B$, and $\angle C$ are all angles in an isosceles triangle. If $\angle A = 40°$ and $\angle B$ and $\angle C$ are base angles in the triangle, what is the measurement of $\angle C$?	$\angle C = 70°$
2. Which polygon has all equal sides and all interior angles equal to 90°?	Square
3. $\angle A$ and $\angle C$ are opposite interior angles in a parallelogram. If $\angle A = 38°$, what is the measurement of $\angle C$?	$\angle C = 38°$
4. Evaluate: 20% of 315	63
5. You currently have \$623 in your chequing account. You then spend \$123 from your chequing account on clothes. You then deposit a cheque worth \$142 into your chequing account. What is the final balance of your chequing account?	\$642
Unit Questions	
6. What is the value of the missing angle, w? 	$w = 41°$
7. Solve for θ: $\frac{4}{\sin 45°} = \frac{4}{\sin \theta}$	$\theta = 45°$
8. Solve for b using the following information: $\sin 90° = 1$, $\sin 30° = 0.5$ $\frac{b}{\sin 30°} = \frac{20}{\sin 90°}$	$b = 10$
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

B–6

Unit B: Geometry and Trigonometry **Specific Learning Outcome: 12.E6.G.1**

General Questions	Answers
1. ∠A, ∠B, and ∠C are all angles in an equilateral triangle. What are the measurements of ∠A, ∠B, and ∠C?	60°
2. A right-angled triangle has side lengths of 7.3 cm, 12.0 cm, and 9.5 cm. Which side length is the measurement of the hypotenuse?	12.0 cm
3. The ratio of the area of two squares is 100 : 64. What is the ratio of the side lengths in lowest terms?	5 : 4
4. Calculate the amount of tax on a $550 item with 12% tax.	$66
5. Juanita invests $2500 for 1 year. The investment has an interest rate of 5%. How much will her investment be worth after one year?	$2625
Unit Questions	
6. What is missing in the order of operations? Brackets, _____, Division, and Multiplication, followed by Addition and Subtraction	Exponents
7. Solve for x: $x^2 = 3^2 + 5^2 - 9$	5
8. Solve for a: $a^2 = 2^2 + 6^2 - 24$	4
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

C–1

Unit C: Business Finance **Specific Learning Outcome: 12.E6.B.1**

General Questions	Answers
1. You are buying lunch for yourself and a friend. You bought two drinks for $2.50 each, one pizza to share for $15, and two individual salads for $5.25 each. You give the cashier $40. How much change should you get back?	$9.50
2. Evaluate: $\frac{(3 \times 4)}{12 + 6}$	$\frac{2}{3}$
3. 15% of 3560 is 534. What is 45% of 3560?	$1602
4. Lunch costs $9, but there is a special for 25% off the total cost after buying a drink for $2. How much is lunch after the discount?	$8.25
5. Calculate the 12% taxes on a $325 item.	$39
Unit Questions	
6. The Diaz family is starting a business. They will have to put in $1500 to start the business. If they make a profit of $300 a week, how long will it take the Diaz family to break even?	5 weeks
7. Bjorn is selling keychains for $3 each or $25 for a box of 10. If Aleem buys 3 boxes plus 4 keychains, how much does he owe Bjorn?	$87
8. Cosima owns a small business selling fruitcakes. Each fruitcake costs $2 to make. In one week, Cosima sold 300 fruitcakes for $6 each. How much profit did she make?	$1200
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

C–2

Unit C: Business Finance **Specific Learning Outcome: 12.E6.B.1**

General Questions	Answers
1. You have a spending limit of $200 on your debit card. You buy two shirts for $30 each and three pairs of jeans for $40 each. How much is left on your daily spending limit?	$20
2. Write this fraction as a decimal and a percent: $\frac{4}{16}$	0.25 or 25%
3. You have recently set up a hot-dog selling business. Your net sales are $2500 and the cost of goods sold is $2225. What is your gross profit?	$275
4. Continue the pattern: 0.125, 0.250, 0.375, ____ , ____	0.5, 0.625
5. Evaluate: $2 \times 3 \times 14$	84
Unit Questions	
6. Artemis makes recurve bows. She will make 10 bows in the next 6 months. Artemis bought maple wood for $1050, as well as parachute cord, rawhide, and other leathers for $300. How much does Artemis need to charge per bow to break even?	$135
Use the following information to answer questions 7 and 8. Fabrizio makes cakes at home and sells them for $50 each. He bought supplies for $200 and groceries for $400.	
7. How many cakes does Fabrizio need to make to break even?	12 cakes
8. If Fabrizio makes and sells 20 cakes, how much profit will he make?	$400
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

C–3

Unit C: Business Finance **Specific Learning Outcome: 12.E6.B.2**

General Questions

1. A small gas station has a gross income of $12,600 in one day. One-third of the sales came from items other than gasoline. How much money did the gas station receive for items other than gasoline in one day?

2. Write the next two numbers in this pattern: 1, 4, 9, 16, 25, _____ , _____

3. There are 52 weeks in a year, so how many weeks are in three years?

4. You have decided to take a trip to Sydney, Australia. Your mom wants to know what time she should call you. Sydney, Australia is 17 hours ahead of Brandon, your home town. If you want your mom to call you between 4 p.m. and 9 p.m. Australia time, what time would this be in Brandon?

5. The area of your property is 120 m^2. If the dimensions of your house are 10 m × 8 m, what is the area of your yard that is not taken up by your house?

Answers

$4200

36, 49

156

between 11 p.m. and 4 a.m. Brandon time

40 m^2

Unit Questions

Use the following information to answer questions 6 and 7.

Chin has a small business. This year`s business expenses are shown on the right.

Description	Cost
advertising	$600
fees/licences	$400
mortgage interest	$1800
property taxes	$200

Description	Cost
house heat	$200
business supplies	$750
house insurance	$250
telephone	$1200

6. If Chin runs his business from his home, what will be the total of his expenses to submit for taxes?

$5400

7. If Chin runs his business from an office, what will be the total of his expenses to submit for taxes?

$2950

8. Afua has a small business as an electrician. His total income is $45,000. See the list of deductions shown below. Only some are tax deductible. Calculate his taxable income.

Type of Deduction	Amount
union dues	$500
child care expenses	$1000
unregistered pension payments	$4000

Type of Deduction	Amount
personal vacation	$3250
business losses	$500
registered pension payments	$3000

$40,000

Other Questions

9.

10.

Mental Math

Grade 12 Essential Mathematics (40S)

D–1

Unit D: Probability **Specific Learning Outcome: 12.E6.P.1**

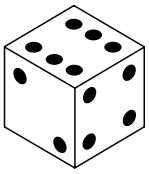
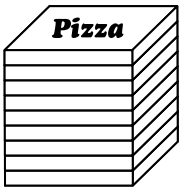
General Questions	Answers
1. What is $\frac{3}{5}$ as a decimal number?	0.6
2. Write this ratio as a fraction: 3 : 7	$\frac{3}{7}$
3. Add these two fractions: $\frac{3}{16} + \frac{2}{4}$	$\frac{11}{16}$
4. Name the numerator and the denominator in this fraction: $\frac{8}{37}$	Numerator: 8 Denominator: 37
5. For every 100 people in the world, 34 have a blood type of A-positive. Write this as a fraction in lowest terms.	$\frac{17}{50}$
Unit Questions	
6. There is a one in ten chance that it will rain today. What is the probability of there being no rain today? Express as a percent.	90%
7. There is a four in five chance it will snow tomorrow. Express this probability as a decimal.	0.8
8. A Manitoba student is in school for about 200 days a year. What is the likelihood that a student with perfect attendance will be in a regular class on August 5? Express as a percent.	0% (no school on August 5)
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

D–2

Unit D: Probability **Specific Learning Outcome: 12.E6.P.1**

General Questions	Answers
1. What is 7% of 200?	14
2. Evaluate: $\left(\frac{5}{7}\right) - \left(\frac{2}{14}\right)$	$\frac{4}{7}$
3. Convert this fraction to a percent and a ratio in lowest terms: $\frac{3}{12}$	25% or 1:4
4. Write two fractions that are equivalent to $\frac{4}{9}$.	Possible answers: $\frac{8}{18}, \frac{12}{27}$
5. One out of five people do not like the colour blue. Write this fraction in percent and decimal form.	20% or 0.20
Unit Questions	
6. A six-sided die is rolled. What is the **probability** that the die will roll a 6? Express as a ratio in lowest terms. 	1:6
7. A six-sided die is rolled. What are the **odds** that the die will roll a 6? Express as a ratio.	1:5
8. You have nine stacked boxes of pizza. Two are cheese, four are Canadian, and three are ham. What are the odds of the first box being a cheese pizza? 	2:7
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

D–3

Unit D: Probability **Specific Learning Outcome: 12.E6.P.1**

General Questions	Answers
1. The odds against winning a certain game are 1 : 2. Convert these odds to a probability.	$P(\text{winning}) = \frac{1}{3}$
2. What is 0.3 × $100?	$30
3. There are 52 cards in a deck, with 13 cards in each suit. What is the probability of drawing a heart (one of the suits)?	$P(\text{heart}) = \frac{13}{52}$
4. From your house, you walk 8 m north, 5 m west, 8 m south, and 4 m east. How far are you from your house (in terms of directions)?	You are 1 m west from your house.
5. Which of the following words would come next in this pattern? One, four, three, eleven, fifteen, thirteen, . . . a) fourteen b) five c) seven d) seventeen	seventeen (9 letters)
Unit Questions	
Use the following table to answer questions 6 to 8. The cost of buying a warranty and the probability of making a claim are shown below.	

Event	Probability	Warranty Cost	Claim Received	Payoff
Paid when making a claim	$\frac{1}{100} = 0.01$	$10	$110	$100
Not making a claim	$\frac{99}{100} = 0.99$	$10	$0	−$10

6. What is the probability × payoff for getting a warranty claim?	$1
7. What is the probability × payoff for not making a warranty claim?	−$9.90
8. What is the expected value of the warranty?	−$8.90
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

D–4

Unit D: Probability **Specific Learning Outcome: 12.E6.P.1**

General Questions	Answers
1. Evaluate: $\left(\frac{2}{9}\right)\times\left(\frac{9}{4}\right)$	$\frac{1}{2}$
2. One-third of students in a class of 108 students have never failed a test. How many students have never failed a test?	36
3. Convert this fraction to a decimal and a percent: $\frac{5}{40}$	0.125, 12.5%
4. Evaluate and express as a mixed fraction in lowest terms: $\frac{5}{6}+\frac{2}{3}$	$1\frac{1}{2}$
5. A group of co-workers wants to purchase pizza for lunch. There are seven co-workers and the pizza costs $84. If each co-worker pays an equal amount of the cost, how much should each person pay?	$12 each

Unit Questions

Answer questions 6 and 7 using the information below.

Devon is doing an experiment with two rats in separate cages that include an area to play and a separate space to eat. He feeds the rats every 12 hours. He comes into the room, pours food in the dish, and then rings the bell. Here are his results from 50 experiments with each rat.

	Already at the Food Dish	Comes to the Bell Sound	Comes to Sound of Food in Dish	Comes at a Later Time
Rat 1	13	15	17	5
Rat 2	0	10	24	16

6. What is the experimental probability that Rat 2 "comes to the bell sound"? Express as a percent.	20%
7. What is the experimental probability that Rat 1 will already be at the food dish when it is time to eat? Express as a percent.	26%
8. Odis the dog likes to catch birds. On average, he catches one bird every 60 days. If Odis caught a bird 51 days ago, what is the probability he will catch a bird today? Express as a fraction.	$\frac{1}{60}$

Other Questions

9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

E–1

Unit E: Vehicle Finance **Specific Learning Outcome: 12.E5.V.1**

General Questions	Answers
1. A computer costs $500. What is the cost including PST (8%) and GST (5%)?	$565
2. The price of a $10,000 snowmobile is reduced by 20%. What is the reduced price of the snowmobile (not including taxes)?	$8000
3. Solve for x: $\frac{200}{500} = \frac{x}{1000}$	400
4. Solve for c: $\frac{8}{c} = 4$	2
5. What is $\frac{400}{2000}$ as a percent?	20%
Unit Questions	
6. Navjot is a college student. Her gross monthly income is $2000. She has rent at $300 a month. She wants to buy a car with payments of $100 a month. Calculate the ratio of her monthly debt to her monthly income.	20%
7. Iliam is a successful businessperson. He grosses $10,000 a month. He pays $2200 a month for his rent and $800 a month for his Mercedes Benz. He wants to purchase a second vehicle for $800 a month. Calculate the ratio of his monthly debt to his monthly income.	38%
8. Baloo wants to buy a new laptop computer. His gross monthly income is $4000. He has a car loan with monthly payments of $1000 and credit card payments of $400 per month. How much can Baloo spend each month on a laptop to reach a maximum ratio of monthly debt to monthly income of 40% (which is $1600)?	$200
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

E–2

Unit E: Vehicle Finance **Specific Learning Outcome: 12.E5.V.1**

General Questions	Answers
1. Savanna was born in 1995. How old will she be in 2031?	36
2. Jackie wants to purchase a DVD for $20, a sweater for $60, a jacket for $120, a pair of jeans for $45, and hair products for $25. If the bank machine only gives out money in multiples of $20, how much money does Jackie need to withdraw from the bank machine to cover the costs of her purchases?	$280
3. Burgandy needs to fundraise $2000 for her school trip. If she earns a profit of $4 from each box of chocolates she sells, how many boxes of chocolates does she need to sell to earn $2000?	500
4. Evaluate: $\frac{2}{3} + \frac{2}{6}$	1
5. Your credit card has a balance of $250. The minimum payment will be $10 or 10% of your balance—whichever is greater. How much is your minimum payment?	$25
Unit Questions	
6. A General Motors van has a base price of $26,000. Optional equipment on the van includes a CD player for $220, cruise control for $500, and leather seats for $1280. There is an excise tax of $100 and a destination charge of $800. Calculate the manufacturer's suggested retail price for the van.	$28,900
7. Rohaan buys a Bentley car. She makes payments of $800 a month for 5 years. She made a down payment of $12,000. How much did she pay for the car?	$60,000
8. Timon buys a Hyundai van. He makes payments of $650 a month for 5 years. How much did he pay for the car?	$39,000
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

E–3

Unit E: Vehicle Finance **Specific Learning Outcome: 12.E5.V.1**

General Questions	Answers
1. If Dave drives at a steady speed of 50 km/h, how long will it take him to drive 10 km?	12 minutes
2. Janice is four times as old as Enrique. If the sum of their ages is 30, how old is Enrique?	6 years old
3. Evaluate: 50×12	600
4. There are seven green and six blue balls in a box. If one ball is randomly selected, what is the probability that it is blue?	$\frac{6}{13}$
5. If $\frac{6000}{50} = 120$, determine the value of $\frac{6000}{120}$.	50
Unit Questions	
6. Lahiq leases an Audi car. He makes payments of $600 a month for 60 months and a down payment of $3000. How much is his total lease?	$39,000
7. Wafaa leases a car for $36,000 over 72 months. How much does she pay each month? Hint: $\frac{\$36,000}{36 \text{ months}} = \$1000$ a month	$500
8. Max is debating whether to pay $42,000 cash for a Dodge truck or make lease payments of $500 monthly for 5 years plus $18,000 to purchase at the end of the lease. Calculate the difference between the two options.	$6000
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

E–4

Unit E: Vehicle Finance **Specific Learning Outcome: 12.E5.V.1**

General Questions	Answers
1. Janique is paid $5 each time she cuts a log. How much will she be paid if she cuts a log into quarters?	$15
2. When Michelle first woke up, the temperature was −5° C. By the time Michelle got home from school, the temperature was 18° C. How much did the temperature rise during that day?	23° C
3. Samir buys a shirt for $30. How much is the shirt, including 8% PST and 5% GST?	$33.90
4. What is 11% of $12,000?	$1320
5. If 6% of $1000 is $60, what is 6% of $1100?	$66
Unit Questions	
6. Ralph buys a new 4-door sedan for $40,000. Calculate the total PST and GST.	$5200
7. Luna buys a used truck for $9250. The book value of the truck is $11,000. How much PST does she pay? (8% PST)	$880
8. Barinder buys a used van for $8000. He pays $640 in PST, $20 for a lien search, and $42 for a safety inspection (including taxes). How much does he pay for the van?	$8702
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

E–5

Unit E: Vehicle Finance **Specific Learning Outcome: 12.E5.V.1**

General Questions	Answers
1. Tanner is trying to calculate the maximum Total Debt Service Ratio, which is 40% of his income. Tanner's gross income is $50,000 a year. What is 40% of his income?	$20,000
2. Calculate the price, including 8% PST and 5% GST, of a vehicle on sale for $22,000.	$24,860
3. Calculate the price, including tax (GST 5% and PST 8%), of a vehicle on sale for $30,000.	$33,900
4. What is 20% of $30,000?	$6000
5. Complete the pattern: 8, 4, 2, 1, $\frac{1}{2}$, $\frac{1}{4}$, ___, ___	$\frac{1}{8}$, $\frac{1}{16}$
Unit Questions	
6. A $40,000 truck depreciates 20% the first year. Calculate the total depreciation in the first year.	$8000
7. A $30,000 car depreciates 10% the first year and then 10% more in the second year. Calculate the depreciation in the second year.	$2700
8. Carlos drove 50 km and he used 4.5 litres of gasoline. What is the fuel consumption rate of his vehicle in L/100 km?	9.0 L/100 km
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

E–6

Unit E: Vehicle Finance **Specific Learning Outcome: 12.E5.V.1**

General Questions	Answers
1. Charlise sees a vehicle priced at $27,500. If Charlise has a down payment of $5250, what is the size of her loan?	$22,250
2. Shantelle is buying meat for a family reunion. She bought $8\frac{3}{4}$ pounds of hamburger, 20.25 pounds of chicken, and 9.5 pounds of steak. How many pounds of meat did Shantelle buy?	38.5
3. On a math test, 22 students earned an A. This number is 20% of the total number of students in the class. How many students are in the class?	110 students
4. Evaluate: $3 \times 5 + 6 - \frac{8}{2}$	17
5. What is 11% of 3500?	385
Unit Questions	
6. Neo has a merit discount of 11%. All-purpose vehicle insurance for Neo's sedan is $1500 before the discount. Calculate the amount of Neo's merit discount.	$165
7. Krystian has a merit discount of 10%. All-purpose vehicle insurance for his van is $2000 before the discount. How much will the insurance be after the discount?	$1800
8. Milan has a pleasure insurance rate of $800. She has a 12% merit discount. How much will the insurance be after the discount?	$704
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

F–1

Unit F: Statistics **Specific Learning Outcome: 12.E5.S.1**

General Questions	Answers
1. What is the median of the following list of numbers? 4, 5, 7, 9, 10, 12	8
2. Evaluate: $12 + 3 - 5 + 3 + 53$	66
3. Which two terms are the same value? $6, 4, \frac{18}{6}, \frac{18}{3}, \frac{18}{2}, \frac{8}{3}$	6 and $\frac{18}{3}$
4. Beth spends 60% of her monthly income on household expenses, including groceries. Of her remaining income, she puts 50% into savings. If Beth's monthly income is $3400, how much money does she have left after groceries and savings?	$680
5. What is one-half of $\frac{1}{7}$?	$\frac{1}{14}$
Unit Questions	
Use the following set of data to answer questions 6 to 8. Data: 8, 8, 9, 10, 12, 13	
6. Find the mean for the set of data above.	10
7. Find the median for the set of data above.	9.5
8. Find the mode for the set of data above.	8
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

F–2

Unit F: Statistics **Specific Learning Outcome: 12.E5.S.1**

General Questions	Answers
1. Estimate the product: 39.2 × 78.9	3200
2. Complete the pattern: 7, 5, 3, 1, −1, ____ , ____	−3, −5
3. What is the total cost of a lunch if the sandwich costs $4.95, a salad costs $5.65, and a drink costs $2.50?	$13.10
4. A manager at a community centre wants to supply hot dogs as a treat for the members. The manager estimates that 120 people will attend and eat three hot dogs each. How many hot dogs does the community centre need to prepare?	360
5. You are buying a new fall wardrobe. You want to purchase five pairs of $50 jeans, two $30 sweaters, and seven $25 shirts. How much will you spend on your fall wardrobe (excluding tax)?	$485.00
Unit Questions	
6. Remove the outlier and calculate the **mean** for the remaining data: 10, 10, 11, 15, 19, 40	13
7. Remove the outlier and calculate the **median** for the remaining data: 17, 18, 20, 20, 22, 27, 29, 31, 67	21
8. To find the 10% trimmed mean of the following data set, which numbers would you remove? (The data set has 20 values.) 1, 4, 6, 6, 8, 10, 12, 12, 14, 14, 15, 17, 18, 18, 19, 22, 23, 23, 40, 70	1 and 70
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

F–3

Unit F: Statistics **Specific Learning Outcome: 12.E5.S.1**

General Questions	Answers
1. What is the lowest common multiple of 6 and 8?	24
2. Evaluate: 3^3	27
3. How many millimetres are equal to 14.1 m?	14 100 mm
4. In a standard deck of 52 cards, what is the probability that you will draw a red card?	$\frac{1}{2}$
5. Evaluate: $\frac{1}{2} - \frac{9}{32}$	$\frac{7}{32}$
Unit Questions	
Use the following information to answer questions 6 to 8. Kamal just received her marks for her first year at university. ■ Introduction to Western Civilization: 2.6 ■ Linear Algebra: 3.0 ■ English Composition: 3.5 ■ Calculus: 3.3 ■ Introduction to Ancient Roman Culture: 2.6	
6. What is Kamal's grade-point average (GPA)?	3.0
7. If Introduction to Western Civilization and Introduction to Ancient Roman Culture are both half-credit courses, calculate Kamal's weighted GPA.	3.1
8. If Linear Algebra was the only half-credit course, calculate Kamal's weighted GPA.	3.0
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

F–4

Unit F: Statistics **Specific Learning Outcome: 12.E5.S.1**

General Questions	Answers
1. Evaluate: $5 \times 17 \times 20$	1700
2. You went to the grocery store to pick up a few items. The total came to $21.37. You gave the cashier $40. What should your change be?	$18.63
3. How many days are in 15 weeks?	105
4. In the months of November, December, and January, it snowed 14 mm, 60 mm, and 76 mm respectively. What is the mean amount of snow that fell each month?	50 mm
5. Complete the pattern: 7, 14, 21, 28, ____ , ____	35, 42
Unit Questions	
Use the following set of data to answer questions 6 to 8. Data: 61, 50, 70, 69, 50	
6. What is 35 more than the median?	96
7. What is the mode times 4?	200
8. What is the mean?	60
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

F–5

Unit F: Statistics **Specific Learning Outcome: 12.E5.S.2**

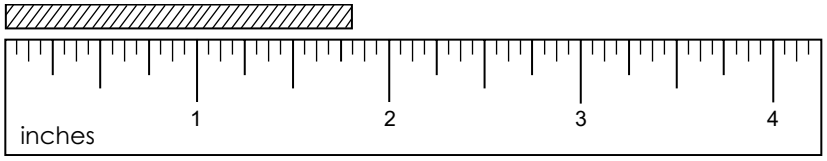
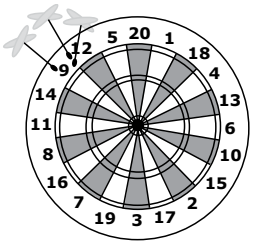
General Questions	Answers
1. Calculate the mortgage if Carmen bought a house for $210,000 and had a down payment of $32,000.	$178,000
2. Solve for x: $\frac{(x+5)}{6} = 7$	37
3. Calculate 75% of 2300.	1725
4. What is the sum of the digits from 1 to 10?	55
5. Marcel is getting ready for school in September. He bought a binder for $11.46, pens for $6.26, and pencils for $3.67. Estimate how much Marcel spent on school supplies.	≈ $21
Unit Questions	
Use the information below to answer questions 6 to 8. N = the total number of scores in the sample b = the number of scores below a given score Percentile Rank $= \frac{b}{N} \times 100$	
6. Your test mark is 65% and three other people in your class of 50 students have the same mark as you. There are 30 people with a lower test mark than you. What is your percentile rank?	60th
7. Your test mark is 83% and one other person in your class of 25 has the same mark as you. There are three people with a **higher** test mark than you. What is your percentile rank?	80th
8. Your test mark is 62% and nobody else in your class of 20 students has your same mark. There are four people with a **higher** mark. What is your percentile rank?	75th
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

G–1

Unit G: Precision Measurement **Specific Learning Outcome: 12.E5.P.1**

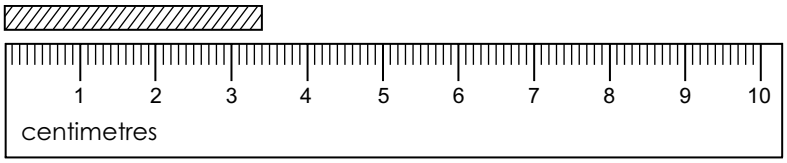
General Questions	Answers
1. Suzanna scores $\frac{26}{75}$ on her World Issues test. Estimate the percent score Suzanna receives on this test.	33.3%
2. What percentile rank is also called the median?	50th
3. 7′2″ = _____ inches	86 inches
4. How many mm^2 are equal to 26 cm^2?	2600 mm^2
5. There are 15 students missing from a class of 50 students. Write this as a fraction in lowest terms.	$\frac{3}{10}$
Unit Questions	
Use the following diagram to answer questions 6 and 7. 	
6. Measure the length of the string, precise to the nearest $\frac{1}{4}''$.	$1\frac{3}{4}''$
7. Measure the length of the string, precise to the nearest $\frac{1}{16}''$.	$1\frac{13}{16}''$
8. Arnaud is playing darts and he is aiming for the bullseye (centre circle). Look at his arrangement of darts and state whether Arnaud has good accuracy, good precision, or both. 	Bad accuracy but good precision
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

G–2

Unit G: Precision Measurement **Specific Learning Outcome: 12.E5.P.1**

General Questions	Answers
1. If the volume of a $1.5 \times 1.5 \times 1.5$ cube is 3.375 units^3, how many times larger would the volume be if the dimensions of the cube were doubled to $3 \times 3 \times 3$?	2^3 or 8 times
2. 135 cm = _____ m	1.35 m
3. Simplify this fraction: $\frac{40}{300}$	$\frac{2}{15}$
4. 3 feet and 1212 inches = _____ feet	104 feet
5. Consider the expression $y = 3x$. What is the value of x when $y = 96$?	$x = 32$
Unit Questions	
Use the following diagram to answer questions 6 to 8. 	
6. Measure the string using the given ruler.	3.4 cm
7. What is the precision?	1 mm or 0.1 cm
8. What is the uncertainty?	±0.5 mm
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

G–3

Unit G: Precision Measurement **Specific Learning Outcome: 12.E5.P.1**

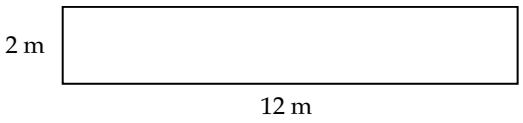
General Questions	Answers
1. Calculate the volume of a cube with each side measuring 30 cm.	27 000 cm^3
2. Calculate $\frac{8}{16}$ of 24.	12
3. What is the unit price of a pen if 10 pens cost $5?	$0.50/pen
4. 0.42 km = _____ m	420 m
5. Calculate the price, including PST of 7% and GST of 5%, of a $25 DVD on sale for 20% off.	$22.40
Unit Questions	
6. There are 12 inches in a foot. How many inches is 3′2″?	38″
7. There are 100 centimetres in a metre. How many cm is 2.45 m?	245 cm
8. What is 64″ in feet and inches?	5′4″
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

G–4

Unit G: Precision Measurement **Specific Learning Outcome: 12.E5.P.1**

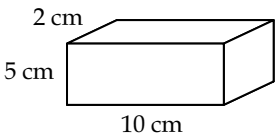
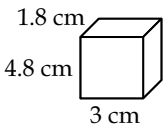
General Questions	Answers
1. Complete the pattern: 9, 18, 27, 36, ___ , ___	45, 54
2. Solve for x: $\frac{7}{8} + 4 = \frac{x}{8}$	39
3. Amandeep is 4′2″ tall. Calculate her approximate height in centimetres. (1 inch = 2.54 cm)	$\approx$ 125 cm = 127 cm
4. What is the perimeter of a triangle with sides measuring 3.6 cm, 3.2 cm, and 4.1 cm?	10.9 cm
5. Evaluate: $\frac{3}{7} - \frac{2}{14}$	$\frac{2}{7}$ or $\frac{4}{14}$
Unit Questions	
Use the diagram below to answer questions 6 and 7.  	
6. Find the area of the rectangle.	24 m^2
7. Find the perimeter of the rectangle.	28 m
8. You want to fence a garden that has a perimeter of 92′. Fencing costs $199.99 for each 25′ section. Approximately how much will the fencing cost before taxes?	$800
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

G–5

Unit G: Precision Measurement **Specific Learning Outcome: 12.E5.P.1**

General Questions	Answers
1. Complete the pattern : 59, 53, 47, 41, _____ , _____	35, 29
2. Simplify this fraction: $\frac{14}{64}$	$\frac{7}{32}$
3. Solve for x: $3x - 2 = 16$	6
4. An 80-page book has 5 chapters. Assuming each chapter has the same number of pages, how many pages are there in each chapter?	16 pages
5. Calculate 6% of $550.	$33
Unit Questions	
Use the diagram shown here to answer questions 6 to 8. 	
6. What is the volume of the box above?	100 cm^3
7. How many of the small boxes shown here can you fit inside the bigger box above? 	3 small boxes
8. What is the perimeter around the bottom of the bigger box?	24 cm
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

H–1

Unit A: Home Finance Review **Specific Learning Outcomes: 12.E5.A.1/E6.H.1**

General Questions or Review Relating to the SLOs	Answers
1. The interest earned on a savings account is 2% annually. How many dollars of interest will you receive in a year on a $500 investment?	$10
2. What percent is halfway between the percents? 3%, _____, 13%	8%
3. Evin buys a house for $100,000 more than Karl's house. Sharra's house costs $50,000 less than Karl's house. If Sharra's house costs $200,000, how much is Evin's house?	$350,000
4. The Ramone family wants to buy a $300,000 house in 6 years. They need a 20% down payment. How much should they save each year to reach their down payment goal?	$10,000 per year
5. The Yasui family have a monthly mortgage payment of $1270. Their electricity costs $150 per month and property taxes are $140 month. Their water bill is $120 every three months. What is the total of all of these expenses each month?	$1600
6. Orlando makes $72,000 per year. How much does he make each month?	$6000
7. Padraig bought a house on February 1. He will have to pay $2400 in property taxes on or before October 1 of the same year. How much should Padraig save each month to pay his property taxes on time?	$300
8. Raven bought a house for $140,000. She will pay a land transfer tax of $0 on the first $30,000, 0.5% on the amount between $30,000 and $90,000, and 1.0% on the amount between $90,000 and $150,000. How much does she pay for the land transfer tax in dollars?	$800
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

H–2

Unit A: Home Finance Review **Specific Learning Outcome: 12.E6.H.1**

General Questions or Review Relating to the SLOs	Answers
1. Vasili has a $300,000 mortgage. He will make a monthly payment of $6 per $1000. Calculate Vasili's monthly mortgage payment.	$1800
2. Maeve has a mortgage for $250,000 over 25 years (or 300 months). She makes mortgage payments of $1000 per month. How much interest will Maeve pay on her mortgage?	$50,000
3. Sadie's house had sewage backup. Her homeowner's insurance covered $120,000 in replacement costs. Sadie spent $110,000 on repairs and $30,300 in furniture and other household contents. Sadie had to pay a $200 deductible to the insurance company. How much did Sadie have to pay?	$20,500
4. The Bailey family have a total portioned assessment of $70,000 on their home. The annual municipal rate is 10 mills. The annual education rate is 11 mills. Calculate the total annual municipal taxes and education taxes for the property.	$1470
5. Raini had a new furnace installed. One day, her furnace broke, costing $5200. The repair technician told her to replace her furnace filter three times a year. Each filter costs $10. She also needs to get an annual furnace inspection, costing $120. How much will Raini spend on maintenance costs in 5 years?	$750
6. Premjot decides to buy a new fridge. His old fridge cost him $700 a year in electricity. His new fridge only costs $25 a month in electricity. How much money does he save each year?	$400
7. Karen buys a new fridge and stove on sale for $3000. The electrical cost of her old appliances was $1200 a year but the new appliances cost only $50 a month for electricity. How many months will it take Karen to get her $3000 back? (Hint: Find the savings first.)	60 months or 5 years
8. Kevin currently rents a house for $1600 a month plus $200 in monthly utilities and tenant insurance for $100 per month. He is thinking about buying a house and will pay mortgage, property taxes, house insurance, utilities, and maintenance for a total of $2200 per month. Which option is cheaper and by how much?	Renting is cheaper by $300 per month
Other Questions	
9.	
10.	

Mental Math

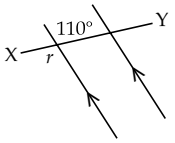
Grade 12 Essential Mathematics (40S)

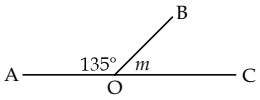
H–3

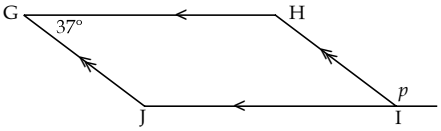
Unit B: Geometry and Trigonometry Review **Specific Learning Outcomes: 12.E5.A.1/E6.G.2**

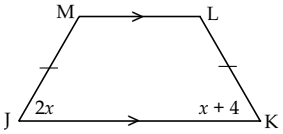
General Questions or Review Relating to the SLOs	Answers
1. Sudoku: Fill in the blanks with the five missing numbers. The numbers 1 to 5 can appear once in each row and in each column.	Row 1 = 3 Row 2 = 5 Row 4 = 3, 4 Row 5 = 3
2. Five people were at work. John finished work before Cassandra but after Amandeep. Riley finished work before Cadence but after Cassandra. Who finished work last?	Cadence
3. A regular pentagon has 5 equal angles. If the sum of the measurements of all the angles is 540°, what is the measurement of each angle?	108°
4. Find the measurement of $\angle r$.	$\angle r = 110°$
5. Find the measurement of $\angle m$.	$\angle m = 45°$
6. Find the measurement of $\angle p$ in parallelogram GHIJ.	$\angle p = 143°$
Use the trapezoid shown here to answer questions 7 and 8.	
7. Solve for x.	4
8. If $\overline{JM}$ is 12 cm, find $\overline{KL}$.	$\overline{KL} = 12$ cm
Other Questions	
9.	
10.	

5		2	4	1
1	4		3	2
3	1	4	2	5
2	5		1	
4	2	1	5	







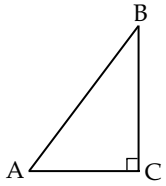
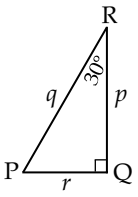


Mental Math

Grade 12 Essential Mathematics (40S)

H–4

Unit B: Geometry and Trigonometry Review **Specific Learning Outcome: 12.E6.G.1**

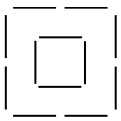
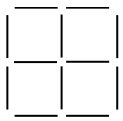
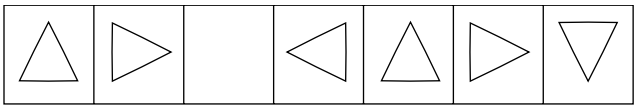
General Questions or Review Relating to the SLOs	Answers
1. Evaluate: $\left(\frac{1}{2}\right)(20 \text{ in.})$	10 in.
2. Evaluate: $\frac{20 \text{ cm}}{\left(\frac{1}{2}\right)}$	40 cm
3. Solve for x: $\frac{1}{2} = \frac{x}{30}$	$x = 15$
4. If $\angle ABC$ is 37°, what is the measure of $\angle BAC$? 	$\angle BAC = 53°$
Use the right triangle shown here to answer questions 5 and 6. Remember, $\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$. $\sin 30° = \frac{1}{2}$ 	
5. If $q = 50$ cm, then $\sin 30° = \frac{r}{50}$. How long is r?	$r = 25$ cm
6. If $r = 20$ in., then $\sin 30° = \frac{20}{q}$. How long is q?	$q = 40$ in.
7. Solve for b: $b^2 = 3^2 + 4^2 - 21$	2
8. Solve for w: $w^2 = 5^2 + 6^2 - 36$	5
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

H–5

Unit C: Business Finance Review **Specific Learning Outcomes: 12.E5.A.1/E6.B.1**

General Questions or Review Relating to the SLOs	Answers
1. Move four sticks to make five squares. 	
2. What is the orientation of the missing shape in the pattern below? 	
3. $4 \times 5 = 20$: We can say that 4 and 5 have a **product** of 20. $4 + 5 = 9$: We can say that 4 and 5 have a **sum** of 9. What are two integers with a product of 35 and a sum of 12?	5 and 7
4. Laurenza is looking for patterns of the 11 times table. She sees that $11 \times 12 = 132$; $11 \times 32 = 352$; $11 \times 41 = 451$; $11 \times 53 = 583$. How is the middle digit related to the first and last digits in each product?	Middle is sum of first and last
5. The Singh family has a mechanic's business. Mr. Singh pays employee salaries of $5000 each month. He pays rent at $1400 per month, and the utility bills are $300 per month. If Mr. Singh wants to pay himself $7000 per month, how much are his total monthly business expenses?	$13,700
6. Wolf builds custom-made desks. For each desk, he charges $40 per hour plus the cost of building materials. Wolf spends 30 hours building a desk. The materials cost $300. How much will the desk cost?	$1500
7. Liza charges $70 for a manicure and pedicure in people's homes. If Liza has 20 clients one week and her expenses are $300, how much profit does she make?	$1100
8. Teo is an electrician and he does contract work. Teo charges the Ming family $7000 to rewire their home. It costs Teo $3300 in materials. How much profit does he make?	$3700
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

H–6

Unit C: Business Finance Review **Specific Learning Outcomes: 12.E6.B.1/E6.B.2**

General Questions or Review Relating to the SLOs	Answers
1. Knowing $\frac{1100}{55} = 20$, what is $\frac{1100}{20}$?	55
Use the following information to answer questions 2, 3, and 4. Sidonie makes costume jewelry. She spends $275 and $325 from two suppliers of beads, metal, hemp, and glue. She buys a glue gun, a vise, and other tools for $400.	
2. Sidonie will make 200 items with her supplies. How much does she need to charge per item to cover the cost of supplies and tools?	$5 per item
3. If Sidonie charges $10 per item, how many pieces of costume jewelry does she need to make to cover the cost of supplies and tools?	100 pieces
4. The next time Sidonie makes a batch of jewelry, she will buy more supplies but she will not buy more tools. If Sidonie makes another 200 items, how much will she need to charge per item to break even?	$3 per item
Use the information provided to answer questions 5 and 6. Chike has a small business. See the list on the right for this year's expenses.	
5. If Chike runs her business from her home, what will be the total of the expenses from the list that she can submit for taxes?	$5700
6. If Chike runs her business from an office, what will be the total of expenses from the list that she can submit for taxes?	$3300
7. Imani has a small business. Her total income is $55,000. Below is a list of deductions, only some of which are tax deductible. Calculate her taxable income.	$46,000
8. Solange submitted her tax return and she calculated that she owes $3500. The government will allow her to pay this back in 12 monthly installments but she will have to pay $100 in interest. How much will she pay each month?	$300 per month
Other Questions	
9.	
10.	

Description	Cost
advertising	$800
telephone	$1500
fees/licences	$200
mortgage interest	$1500

Description	Cost
house heat	$300
property taxes	$300
supplies	$800
house insurance	$300

Type of Deduction	Amount
personal vacation	$4500
child care expenses	$2000
unregistered pension payments	$3000

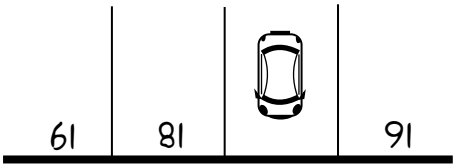
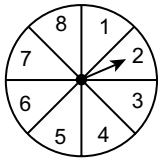
Type of Deduction	Amount
business losses	$400
union dues	$600
registered pension payments	$6000

Mental Math

Grade 12 Essential Mathematics (40S)

H–7

Unit D: Probability Review **Specific Learning Outcomes: 12.E5.A.1/E6.P.1**

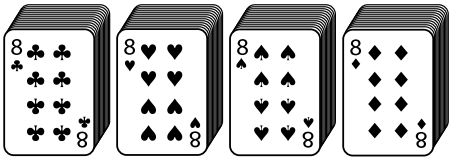
General Questions or Review Relating to the SLOs	Answers
1. This is an overhead view of a parking lot with painted spot numbers. What is the number of the parking spot that the car is in? Hint: Think of the view of the driver. 	17 (the numbers are upside down)
2. Simplify the fraction: $\frac{64\ 246}{2}$	32 123
3. Express $\frac{3}{4}$ as a percent.	75%
4. Express $\frac{2}{25}$ as a percent.	8%
Use the spinner shown here to answer questions 5, 6, and 7. 	
5. What is the probability that the spinner will land on an even number? Express as a ratio in lowest terms.	1:2
6. What is the likelihood that you will spin a number less than 7? Express as a percent.	75%
7. What are the odds that the spinner will land on an even number? Express in lowest terms.	1:1
8. There is a 25% chance of rain. What are the odds that it will rain?	1:3
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

H–8

Unit D: Probability Review **Specific Learning Outcome: 12.E6.P.1**

General Questions or Review Relating to the SLOs	Answers
There are four suits in a deck of cards (clubs, spades, diamonds, and hearts). There are 13 cards in each suit. There are 4 of each type of card. Use this information to answer questions 1 to 3. 	
1. What is the probability that you will not pick a heart in a deck of 52 cards? Express as a fraction in lowest terms.	$\frac{3}{4}$
2. What are the odds of drawing an 8?	4 : 48 or 1 : 12
3. What are the odds of drawing a 2, 3, 4, 5, or 6?	20 : 32 or 5 : 8
4. What is 30% of $200?	$60
Use the following table to answer questions 5 to 7. This table represents the odds of winning and losing at a dice game.	

Event	Probability	Amount Won	Cost to Play	Payoff
Winning	$\frac{3}{5} = 0.6$	$220	$20	$200
Losing	$\frac{2}{5} = 0.4$	$0	$20	−$20

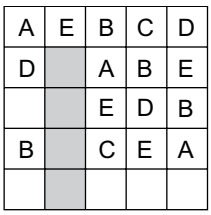
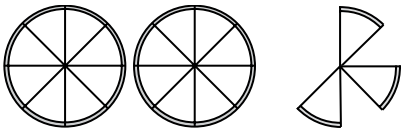
5. What is the probability × payoff for winning the game?	$120
6. What is the probability × payoff for losing the game?	−$8
7. What is the expected value of the game?	$112
8. A volcano, Mount Artemis, erupts approximately every 300 years. If Mount Artemis last erupted in 1761, what are the chances it will erupt this year? Express your answer as a fraction.	$\frac{1}{300}$
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

H–9

Unit E: Vehicle Finance Review **Specific Learning Outcomes: 12.E6.A.1/E5.V.1**

General Questions or Review Relating to the SLOs	Answers
1. Alphabet Sudoku: The letters A, B, C, D, and E can appear once in each row and in each column. Determine the four shaded spaces in column 2. 	Row 2 = C Row 3 = A Row 4 = D Row 5 = B
2. Represent the pizzas shown here as an improper fraction. 	$\frac{19}{8}$
3. There are 30 students in a class. Five students do not play the piano or the saxophone. Of the remaining students, 16 students play only the saxophone and another 6 students play the saxophone and the piano. How many students play the piano but not the saxophone?	3 students
4. Evaluate: $24 + 25 \times 3$	99
Use the following information to answer questions 5 and 6. Alaine has a $30,000 down payment to buy a house. The mortgage payments will be $1200 per month with property taxes at $120 per month and $80 monthly for heating. She currently has a car payment of $500 per month and credit card debt of $100 monthly. Her gross income is $5000 per month.	
5. Calculate 40% of Alaine's income.	$2000
6. If she buys the house, calculate the ratio of Alaine's monthly debt to her monthly gross income.	40%
7. A Lexus car has a base price of $52,000. Optional equipment includes a 5-stack CD player for $700, remote start for $600, and leather seats for $3000. There is an excise tax of $100 and a destination charge of $400. Calculate the manufacturer's suggested retail price for the car.	$56,800
8. Aaqib takes out a car loan for a Toyota truck. He makes payments of $800 a month for 60 months and he made a down payment of $5000. How much does he pay for the truck altogether?	$53,000
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

H–10

Unit E: Vehicle Finance Review **Specific Learning Outcome: 12.E5.V.1**

General Questions or Review Relating to the SLOs	Answers
1. Noureddin leases a Honda car for 60 months with payments at $500 a month. After his lease is up, Noureddin can pay another $10,000 to buy the car. How much does he pay for the car in total?	$40,000
2. Luna leases a Chevy van with monthly payments of $610 a month for 5 years. How much did she pay for the lease?	$36,600
3. Morningstar buys a 3-year-old car for $18,000. She pays PST of $1440, a lien search for $30, and a safety inspection costing $60, including taxes. How much does she pay for the car?	$19,530
4. Hateyah wants to buy a used car that needs repairs. He takes it to a shop and they charge him $120 for the safety inspection and diagnostic test. The shop will charge $2100 for repairs. The price for the car is $6000 and the PST is $480. How much will he pay for the car?	$8700
5. A $50,000 SUV depreciates 20% the first year and 10% more in the second year. What is the depreciation in the second year?	$4000
6. Cindy drove 200 km and used 24.6 litres of gasoline. What is the fuel consumption rate of her vehicle in L/100 km?	12.3 L/100 km
7. Bear has a merit discount of 12%. Pleasure insurance for his vehicle has a rate of $750 before the discount. Calculate the amount of Bear's discount.	$90
8. Navjot has a merit discount of 10%. All-purpose vehicle insurance for Navjot's car is $1800 before the discount. How much will the insurance be after the discount?	$1620
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

H–11

Unit F: Statistics Review **Specific Learning Outcomes: 12.E6.A.1/E5.S.1**

General Questions or Review Relating to the SLOs	Answers
1. Kaymin and Shaquiel are making pancakes. One full recipe requires $\frac{3}{4}$ cups of flour. They wish to double the recipe. How many cups of flour do they need?	$1\frac{1}{2}$ or $\frac{3}{2}$
2. Alizon is making pancakes with the same recipe requiring $\frac{3}{4}$ cups of flour. She wants to make half a recipe. She estimates that a $\frac{1}{2}$ cup of flour is needed. Is that an underestimate or an overestimate?	Overestimate
3. Five people went into a hairdressing shop for haircuts. Omar went in before Chetan but after Simarpal. Rob went before Klaus but after Chetan. Who went into the shop last?	Klaus
Use the following data to answer questions 4 to 8. 2, 4, 4, 5, 6, 7, 14, 38	
4. What is the median?	5.5
5. What is the mode?	4
6. What is the mean?	10
7. Eliminate the outlier and calculate the median.	5
8. Eliminate the outlier and calculate the mean.	6
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

H–12

Unit F: Statistics Review **Specific Learning Outcomes: 12.E5.S.1/E5.S.2**

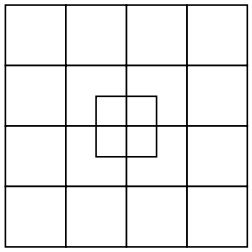
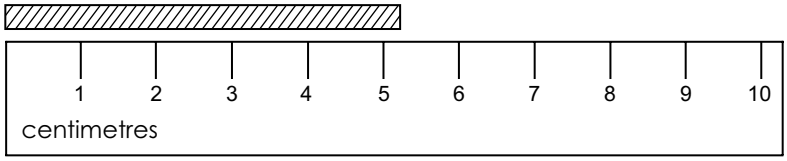
General Questions or Review Relating to the SLOs	Answers
Use the following information to answer questions 1 and 2. Amanda just received her marks for her second year at university. ■ English Literature: 4.0 ■ Greek Mythology: 4.0 ■ Anatomy and Physiology: 2.6 ■ Observational Astronomy: 3.8	
1. What is Amanda's grade-point average (GPA)?	3.6
2. If English Literature and Observational Astronomy are half-credit courses, what is Amanda's weighted GPA?	3.5
Use the following data to answer questions 3 to 5. 5, 4, 11, 6, 4	
3. What is 27 more than the median?	32
4. What is the mode times 7?	28
5. What is the mean divided by 2?	3
Use the information below to answer questions 6 to 8. N = the total number of scores b = the number of scores below a given score $\text{Percentile Rank} = \frac{b}{N} \times 100$	
6. Your test mark is 80% and three other people in your class of 50 students have the same mark as you. There are 28 people with a lower test mark than you. What is your percentile rank?	56th
7. Your test mark is 77% and one other person has the same mark as you in your class of 25 students. There are 21 people with a lower test mark than you. What is your percentile rank?	84th
8. Your test mark is 72% and, in your class of 20 students, nobody else has the same mark as you. There are two people with a higher mark. What is your percentile rank?	85th
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

H–13

Unit G: Precision Measurement Review **Specific Learning Outcomes: 12.E6.A.1/E5.P.1**

General Questions or Review Relating to the SLOs	Answers
1. □ + □ + ○ = 21 ; ○ = △ + □ = 10 ; △ = ○ + ○ = 18 ; □ =	○ = 9 △ = 4 □ = 6
2. Complete the sequence: 3, 7, 11, ____ , ____	15, 19
3. How many squares are there? 	35
4. State the precision of 452.36 cm.	hundredth of a centimetre
5. State the precision of 24.1 m.	tenth of a metre
Use the following diagram to answer questions 6 to 8. 	
6. Measure the string using the given ruler.	5 cm
7. What is the precision?	nearest centimetre
8. What is the uncertainty?	±0.5 cm
Other Questions	
9.	
10.	

Mental Math

Grade 12 Essential Mathematics (40S)

H–14

Unit G: Precision Measurement Review **Specific Learning Outcome: 12.E5.P.1**

General Questions or Review Relating to the SLOs	Answers
1. There are 12 inches in a foot. How many inches is 4′6″?	54″
2. What is 51″ in feet and inches?	4′3″
3. There are 100 centimetres in a metre. How many cm is 3.4 m?	340 cm
Use the following information to answer questions 4 to 8. You are redecorating your bedroom. ■ The bedroom has four walls all measuring 12′ by 10′ high. ■ You have a window that is 5′ × 5′ on one wall. ■ You have a door that measures 3′ wide by 7′ high.	
4. How many feet of baseboards do you need to go around all four walls? (Your door does not need baseboards.)	45′
5. What is the total area of the window and door openings?	46 ft.^{2}
6. You want to paint. What is the total surface area of the bedroom walls? (You don't need paint for the window or door.)	434 ft.^{2}
7. You buy primer and paint for your room. You need one can of primer at $22 and two cans of paint at $39 each. How much will this cost with taxes (PST 8% and GST 5%)?	$113
8. You want to buy new carpeting at $2 per square foot. How much will it cost before taxes to carpet your room?	$288
Other Questions	
9.	
10.	

Printed in Canada
Imprimé au Canada