Mental Math

Grade 9 Mathematics (10F)

I–1

Strand: Number Review **Specific Learning Outcomes: 9.N.1 and 9.N.2**

General Questions or Review Relating to the SLOs	Answers
Evaluate:	
1. 2^5	32
2. 3^0	1
3. -1^4	-1
4. $2^3 + 3^2$	17
5. $4^3 - 5^2$	39
6. Write the following as a power: $3 \times 3 \times 3 \times 3$	3^4
Simplify to a single power:	
7. $3^4 \times 3^5$	3^9
8. $\dfrac{5^{13}}{5^7}$	5^6
9. $\left(4^3\right)^2$	4^6
10. $\left(5^3\right)\left(5^0\right)$	5^3
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I–2

Strand: Number Review   **Specific Learning Outcomes: 9.N.1 and 9.N.2**

General Questions or Review Relating to the SLOs	Answers
Simplify to a single power:	
1. $9^2 \times 9^5$	9^7
2. $\left(5^3\right)^4$	5^{12}
3. $4^3 \times 4^5$	4^8
4. $\dfrac{8^{10}}{8^6}$	8^4
Evaluate:	
5. $(-2)^3$	-8
6. $-(3)^4$	-81
7. $(-4)(-4)(-4)$	-64
8. $\dfrac{4^0 \times 2^3}{2}$	4
9. $\dfrac{3^2 + 2^0}{5}$	2
10. $\dfrac{8^2}{4^3}$	1
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I–3

Strand: Number Review

Specific Learning Outcomes: 9.N.3 and 9.N.4

General Questions or Review Relating to the SLOs	Answers
1. Place in ascending order: $\dfrac{3}{4}, \dfrac{2}{5}, \dfrac{4}{6}$	$\dfrac{2}{5}, \dfrac{4}{6}, \dfrac{3}{4}$
2. What is the decimal number that corresponds to $0.8 + \dfrac{3}{4}$?	1.55
3. The fraction $\dfrac{35}{4}$ is between which two consecutive whole numbers?	8 and 9
For questions 4 and 5, place numbers in descending order.	
4. $\dfrac{32}{4}, 8^0, 2^4$	$2^4, \dfrac{32}{4}, 8^0$
5. $-0.8, -\dfrac{4}{7}, -0.2$	$-0.2, -\dfrac{4}{7}, -0.8$
Evaluate:	
6. $3 + 2^3$	11
7. $\left(7^0 + 3^2\right)^2$	100
8. $\dfrac{4 + 2^3}{6}$	2
9. $(-3)\left(4^2 + 2^0\right)$	-51
10. $\dfrac{2^5}{4^2} - 5^0$	1
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I–4

Strand: Number Review   **Specific Learning Outcome: 9.N.5**

General Questions or Review Relating to the SLO	Answers
Evaluate:	
1. $\sqrt{\dfrac{25}{16}}$	$\dfrac{5}{4}$
2. $\sqrt{\dfrac{4}{9}} + \dfrac{\sqrt{25}}{3}$	$\dfrac{7}{3}$
3. $\sqrt{3^4}$	9
4. $\left(\sqrt{10^2}\right) \div 10$	1
5. $-\sqrt{64}$	-8
6. Which numbers are not perfect squares: 4, 89, 121, 256, 1000?	89 and 1000
7. The square root of a number is 15. What is the number?	225
8. What is the number if the square root is 14?	196
9. The product of two numbers is 36. What is the product of their square roots?	6
10. Evaluate: $\left(\sqrt{36} - \sqrt{16}\right)^2$	4
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I–5

Strand: Number Review   **Specific Learning Outcomes: 9.N.1 to 9.N.6**

General Questions or Review Relating to the SLOs	Answers
For questions 1 to 4, estimate the value.	
1. $\sqrt{9.2 \times 3.9}$	≈ 6
2. $\sqrt{\dfrac{145}{9}}$	≈ 4
3. $\sqrt{0.17}$	≈ 0.4
4. $\sqrt{50}$	≈ 7
5. The square of 6.1 is close to what whole number?	37
Evaluate:	
6. $9^2 - 4^3$	17
7. $\dfrac{3 \times 3 \times 3 - 5 \times 5}{2^0}$	2
8. $\sqrt{\dfrac{5^4}{25}}$	5
9. $\dfrac{\left(7^2\right)^2}{49} + 1$	50
10. $\sqrt{12 \times 10 + 3^0}$	11
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I–6

Substrand: Patterns Review   **Specific Learning Outcomes: 9.PR.1 and 9.PR.2**

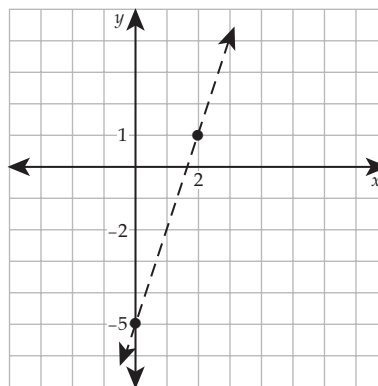| General Questions or Review Relating to the SLOs	Answers
Find the next term in the following patterns.	
1. 28, 31, 34, _____	37
2. 23, 16, 9, _____	2
Susan initially owes her neighbour $5.00. She rakes their lawn and is paid $3 per hour. Using the graph of this scenario shown below, answer questions 3 to 7.	
3. What is x when y is equal to 1?	2
4. How much does the value of y increase when the value of x increases by 1?	3
5. What is y when x is equal to 3?	4
6. What is y when x equals 0?	−5
7. What is x when y is equal to −2?	1
8. Saad is 5 years younger than three times the age of Natasha. What is the age of Saad if Natasha is 3 years old?	4 years old
9. Complete the pattern: 7, 14, 21, _____	28
10. You can represent the pattern 9, 16, 25, 36, . . ., using a linear equation? True or false?	False
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I–7

Substrand: Patterns Review   **Specific Learning Outcomes: 9.PR.1 and 9.PR.2**

General Questions or Review Relating to the SLOs	Answers
1. If $y = x + 3$, what is the value of y if $x = 3$?	6
2. If $y = 3x - 2$, what is the value of x if $y = 13$?	5
3. If $y = 5x + 3$, what is the value of y if $x = 4$?	23

Use the table for questions 4 to 10. The variable h represents the number of hours of work and the variable s is the salary.

h	0	7	10	25
s	0	56	80	200

	Answers
4. If $h = 15$, what is s?	120
5. If $s = 64$, what is h?	8
6. If $h = 30$, what is s?	240
7. If $s = 800$, what is h?	100
8. What is the hourly rate of pay?	$8/hour
9. How many hours of work correspond to a salary of $888?	111 hours
10. What would be the salary equivalent to 8 hours of work each day for 5 days?	$320
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I–8

Substrand: Variables and Equations Review   **Specific Learning Outcome: 9.PR.3**

General Questions or Review Relating to the SLO	Answers
Solve the following equations.	
1. $5x = 20$	$x = 4$
2. $2x - 16 = 18$	$x = 17$
3. $3x - 5 = x + 7$	$x = 6$
4. $3(x - 2) = 9$	$x = 5$
5. $6x = 16 + 2x$	$x = 4$
6. $\dfrac{1}{2}x = 8$	$x = 16$
7. $\dfrac{3}{4}x - 3 = 6$	$x = 12$
8. $\dfrac{8}{x} = 12$	$x = \dfrac{2}{3}$
9. $3x + 4 = 2(2x - 1)$	$x = 6$
10. $\dfrac{x}{2} + 1 = \dfrac{3x}{2} - 7$	$x = 8$
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

Substrand: Variables and Equations Review   **Specific Learning Outcomes: 9.PR.3 and 9.PR.4**

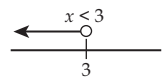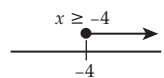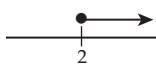| General Questions or Review Relating to the SLOs	Answers
Solve the following equations and inequalities.	
1. $3x + 9 = 6$	$x = -1$
2. $\dfrac{3}{x} + \dfrac{2}{x} = 5$	$x = 1$
3. $\dfrac{1}{3}(m + 12) = \dfrac{2}{6}$	$m = -11$
4. $\dfrac{x}{4} - \dfrac{7}{4} = \dfrac{1}{4}$	$x = 8$
5. $3x < 9$	$x < 3$ 3
6. $2x - 3 \geq 3x + 8$	$x \leq -11$ –11
7. $2x + 6 \geq -2$	$x \geq -4$ –4
8. $5 - 3x < -10$	$x > 5$ 5
Write a linear inequality to represent the following.	
9. Five chocolate bars cost more than \$12 and the cost of each bar is unknown.	$5x > 12$
10. Jean ran less than 18 km in 3 hours and his speed is unknown.	$3x < 18$
Other Questions	
11.	
12.	
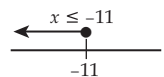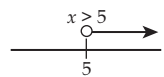
Mental Math
Grade 9 Mathematics (10F)

Substrand: Variables and Equations Review　　　**Specific Learning Outcomes: 9.PR.4 and 9.PR.5**

General Questions or Review Relating to the SLOs	Answers
1. $x < 3$ is the general solution of the linear inequality $2x - 1 \leq x + 2$. True or false?	False
2. The graph shown on the right is the general solution to the linear inequality $3 - 2x \leq 1 - x$. True or false?	True
3. $x = 5$ is a solution to the linear inequality $3 - 2x \leq 1 - x$. True or false?	True
4. $x = 4$ is a solution to the linear inequality $\frac{2}{3}x - 1 > 2$. True or false?	False
Respond to questions 5 to 10 concerning the polynomial $3x^2 - 2y^2 + 9$.	
5. What are the two variables in the polynomial?	x and y
6. What is the coefficient of the variable y?	-2
7. How many terms does the polynomial have?	3
8. What is the exponent of the variable x?	2
9. What is the value of the constant?	9
10. What is the coefficient of the variable x?	3
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I–11

Substrand: Variables and Equations Review   **Specific Learning Outcome: 9.PR.6**

General Questions or Review Relating to the SLO	Answers
Simplify the following polynomials for questions 1 to 4.	
1. $3x - 2x^2 + x - 3x^2$	$4x - 5x^2$
2. $4a^2 + 4 - 3a^2 - 1$	$a^2 + 3$
3. $m + 6 - 4 - 2m$	$-m + 2$
4. $5y - 3 + y^2 - 2y - 4y^2 + 5$	$-3y^2 + 3y + 2$
5. Write a polynomial of 4 terms equivalent to $2p - 5$.	Sample: $3p - p - 7 + 2$
Write an expression for the perimeter for questions 6 to 8.	
6. A rectangle that has a length of $5d + 2$ and a width of $3d - 1$.	$16d + 2$
7. The three sides of a triangle are w, $3w + 4$, and $4w - 2$.	$8w + 2$
8. The side of a square is $5x + 3$.	$20x + 12$
Simplify the following polynomials for questions 9 and 10.	
9. $(4x - 2) + (8x + 5)$	$12x + 3$
10. $(5m - 3) - (2m - 7)$	$3m + 4$
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I–12

Substrand: Variables and Equations Review   **Specific Learning Outcomes: 9.PR.6 and 9.PR.7**

General Questions or Review Relating to the SLOs	Answers
Simplify the following polynomials for questions 1 to 3.	
1. $(7c - 5) - (4c)$	$3c - 5$
2. $3x - (4 - 6x)$	$9x - 4$
3. $(y + 7) + (y^2 - 7)$	$y^2 + y$
Multiply the following monomials for questions 4 to 6.	
4. $(3x)(-2x)$	$-6x^2$
5. $\dfrac{2}{3}t(3t)$	$2t^2$
6. $(-8y)(-3y)$	$24y^2$
Divide the following equations for questions 7 to 9.	
7. $\dfrac{8x^2}{2x}$	$4x$
8. $(5xy) \div (5y)$	x
9. $(-12x^2) \div (4x)$	$-3x$
10. The area of a rectangle is $72t^2$ and its width is $12t$. What is its length?	$6t$
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

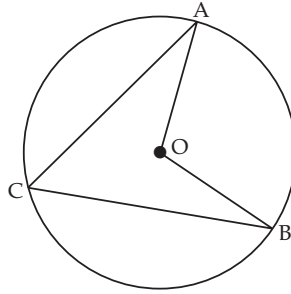I–13

Substrand: Measurement Review   **Specific Learning Outcome: 9.SS.1**

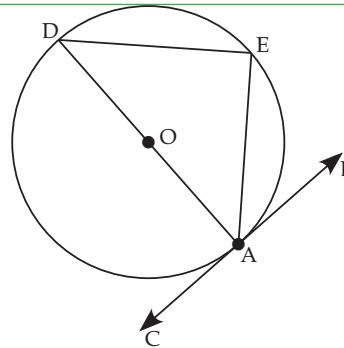| General Questions or Review Relating to the SLO	Answers
For questions 1 to 3, point O is the centre of the circle.	
1. If ∠AOB = 32°, what is the measure of ∠ACB?	16°
2. If ∠ACB = 54°, what is the measure of ∠AOB?	108°
3. If $\overset{\frown}{ACB}$ = 320°, what is the measure of ∠AOB?	40°
For questions 4 to 7, CB is tangent to diameter AD at point A on the circle with centre O.	
4. What is the measure of ∠BAD?	90°
5. What is point A called?	the tangent point
6. What is the measure of ∠DEA?	90°
7. What is arc DEA called?	semicircle
For questions 8 to 10, use the following figure.	
8. If ∠ABE = 85°, what other angle measures do you know?	∠ACE = 85° and ∠ADE = 85°
9. What name is given to angles such as ∠ABE, ∠ACE, and ∠ADE?	inscribed angle
10. Complete the following sentence. ∠ABE and ∠ACE are congruent because they are subtended by _____.	the same arc
Other Questions	
11.	
12.	
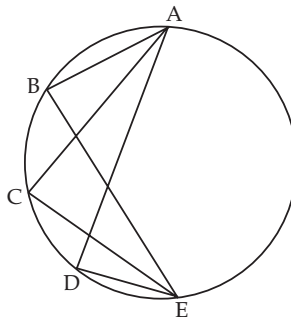
Mental Math

Grade 9 Mathematics (10F)

Substrand: Measurement Review   **Specific Learning Outcome: 9.SS.1**

General Questions or Review Relating to the SLO	Answers
Given the circle with centre O, diameter AD, tangent IJ, tangent point D, and the measure ∠BFC = 34°, determine the measure of:	
1. ∠ADJ	90°
2. ∠BGC	34°
3. ∠BEC	34°
4. ∠BOC	68°
5. ∠ACD	90°
6. ∠AHD	90°
Using the diagram above, give an example of	
7. an inscribed angle of arc AH.	∠ADH
8. a central angle involving point B.	∠BOC and ∠BOA
9. a radius.	AO, BO, CO, or DO
10. ∠AHD is subtended by an arc. What is the name of the arc?	$\overarc{AD}$
Other Questions	
11.	
12.	
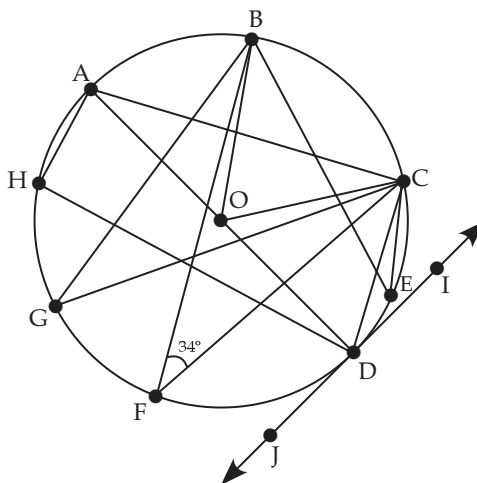
Mental Math

Grade 9 Mathematics (10F)

Substrand: 3-D Objects and 2-D Shapes Review   **Specific Learning Outcome: 9.SS.3**

General Questions or Review Relating to the SLO	Answers
Complete the phrase for questions 1 and 2.	
1. If two triangles are similar, the corresponding angles are ————.	congruent
2. If two triangles are similar, measurements of corresponding sides are ————.	proportional
3. Any two triangles are similar. True or false?	False
4. Any two regular pentagons are similar. True or false?	True
Calculate the missing value for questions 5, 6, and 7.	
5. $\dfrac{x}{4} = \dfrac{6}{24}$	1
6. $\dfrac{2}{x} = \dfrac{8}{12}$	*3*
7. $\dfrac{5}{3} = \dfrac{25}{x}$	15
8. Why are all rectangles not similar?	Corresponding sides may not be proportional.
Use the two similar triangles shown for questions 9 and 10 to evaluate y and x.	
9. y	12
10. x	20
Other Questions	
11.	
12.	

Mental Math
Grade 9 Mathematics (10F)

I–16

Substrand: Transformations Review　　　　**Specific Learning Outcome: 9.SS.4**

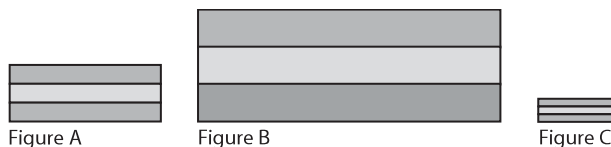| General Questions or Review Relating to the SLO	Answers
1. A square is redrawn in a ratio of 2:1. If the sides of the first square measure 8 cm, what is the measure of the sides of the second square?	16 cm
2. The side of a 12 cm rectangle was reduced so that its side measures 8 cm. What scale factor was used?	$\dfrac{2}{3}$
3. A figure has a perimeter of 18 inches. If this figure is enlarged on a scale of 5:3, what will be the perimeter of the new figure?	30 inches
4. A figure with a 10 cm perimeter is initially enlarged according to a scale of 3:2 and then reduced with a scale of 2:3. What is the perimeter of the new figure?	10 cm
Use Figures A, B, and C for questions 5 to 8. Figure A　　Figure B　　Figure C	
5. Estimate the scale factor used to transform Figure A to Figure B.	2
6. What is the scale factor used to transform Figure B to Figure A?	$\dfrac{1}{2}$
7. Estimate the scale factor to transform Figure A to Figure C.	0.5 or $\dfrac{1}{2}$
8. Estimate the scale factor used to transform Figure C to Figure B.	4
For questions 9 and 10, four identical squares can be placed in a large square.	
9. What is the scale factor used to transform a small square to the large square?	2
10. If one side of the large square measures 20 cm, what is the measure of a side of a small square?	10 cm
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I–17

Substrand: Transformations Review　　　　　**Specific Learning Outcome: 9.SS.5**

General Questions or Review Relating to the SLO	Answers
Point A is (4, −2). What would the coordinates of point A be after each of the requested transformations?	
1. A reflection over the *x*-axis.	(4, 2)
2. A reflection over the *y*-axis.	(−4, −2)
3. A reflection over the origin.	(−4, 2)
Point B is (3, 1). Find the new coordinates of point B after completing a rotation in relation to the origin with each of the following angles.	
4. 90° clockwise	(1, −3)
5. 180°	(−3, −1)
6. 90° counter-clockwise	(−1, 3)
7. 270° clockwise	(−1, 3)
For the following figure, determine	
8. the number of lines of symmetry.	3
9. the order of rotation.	3
10. the angle of rotation.	120°
Other Questions	
11.	
12.	
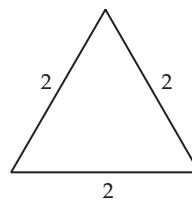
For question 8–10, the figure is an equilateral triangle with sides labelled 2, 2, and 2.

Mental Math

Grade 9 Mathematics (10F)

Substrand: Data Analysis Review   **Specific Learning Outcome: 9.SP.1**

General Questions or Review Relating to the SLO	Answers
Identify the factor that would influence the results of data collection for questions 1 to 10.	
1. The person must give their phone number.	privacy
2. The person must answer questions before 1 p.m.	time and timing
3. The question demonstrates a preference for the product.	a bias
4. The sample is not representative of the population.	a bias
5. The person does not understand the questions.	use of language
6. The question refers to religion.	cultural sensitivity
7. The question asks for judgment on a particular person.	ethics
8. A telephone survey takes more than 45 minutes.	time and timing
9. The survey focuses on luxury cars.	cost/bias
10. The person must indicate in what country they were born.	privacy
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

Substrand: Data Analysis Review   **Specific Learning Outcomes: 9.SP.2 and 9. SP.3**

General Questions or Review Relating to the SLOs	Answers
1. A sample is representative of a _____.	population
2. A census collects data from a _____.	population
For questions 3 to 6, determine whether you should use a *sample* or a *population*.	
3. A school wants to know what sport interests the students.	population
4. A pen factory wants to know if all pens are manufactured correctly.	sample
5. Pierre wants to know if teachers prefer to wear long-sleeve or short-sleeve shirts.	sample
6. A small organization wants to know the proportion of people in the organization who were born in Winnipeg and live in Winnipeg.	population
For questions 7 to 9, determine whether a sample or a population has been used.	
7. To determine the life of a light bulb, a company has randomly selected 150 light bulbs	sample
8. To determine the wishes of the student body, Marc asked everyone who was in the cafeteria which school president candidate they would vote for.	sample
9. To determine what technology to use with her class, a teacher asked her students if they had a cellphone.	population
10. Out of 2000 people, 450 were given a survey. This is a _____.	sample
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I–20

Substrand: Data Analysis Review

Specific Learning Outcome: 9.SP.4

General Questions or Review Relating to the SLO	Answers
1. In a class, 5 out of 20 students do not like chocolate. What is the probability that a person likes chocolate?	$\frac{3}{4}$ or 0.75
2. The probability of seeing a red car in Winnipeg is 0.40. How many red cars would you expect to see if there are 500 000 cars?	200 000
3. What is the probability of rolling a prime number with a regular 6-sided die?	$\frac{3}{6} = \frac{1}{2}$
For questions 4 to 7, describe the type of probability as theoretical or experimental in each of the scenarios.	
4. After rolling a number cube (die) 6 times, Nadine says that the probability of rolling a 4 is $\frac{2}{6}$.	experimental
5. The probability of showing "heads" when flipping a coin is $\frac{1}{2}$.	theoretical
6. By randomly surveying 100 people, it was determined that 15% of people have blue eyes.	experimental
7. The probability of drawing a green ball out of a bag that contains 1 green, 2 blue, and 1 yellow ball is 0.25.	theoretical
For questions 8 to 10, there is 1 black ball and 3 white balls in a bag. Marc takes a ball, determines its colour, and puts it back in the bag.	
8. What is the theoretical probability (as a percent) that he pulls a black ball on his first pull?	25%
9. What is the theoretical probability (as a percent) that he pulls a white ball on his second pull?	75%
10. If Marc picks a ball and replaces it, twice, and pulls 2 white balls, what is the experimental probability of pulling a white ball (as a percent)?	100%
Other Questions	
11.	
12.	