NAME:_____

MATH 10C FINAL PRACTICE

WRITTEN RESPONSE ANSWERS

Math 10 C

WR

Practice

Questions

(3 questions: 5 marks each)

KEY/RUBRIC

WR 1: (*5 marks*)

- The data in the table shown represents a linear relationship between *x* and *y*. Fill in the missing values in the table.

x	0	1	2	3	5
y	5	12	19	*26*	40

- **Determine** the equation for the relationship above, in the form $y = mx + b$, where $m \in I, b \in I$

(0,5) gives us $b = 5$, so $y = mx + 5$ OR

$m = \dfrac{12 - 5}{1 - 0} = \dfrac{7}{1} = 7$, so $y = 7x + 5$

$19 = m(2) + b$
$\underline{12 = m(1) + b}$
$7 = m$
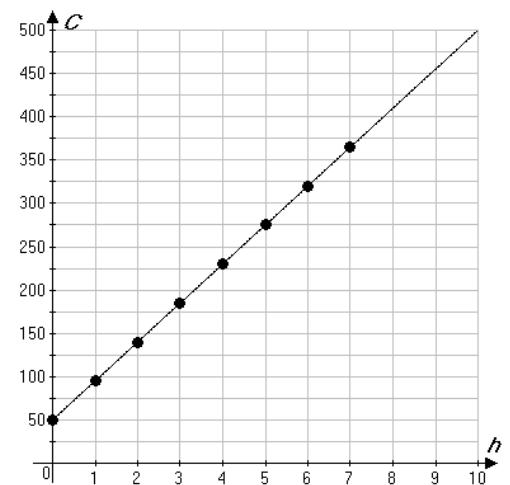*and* $12 = 7(1) + b$
$\therefore 5 = b$
So $y = 7x + 5$

- An appliance repair company uses the following formula that relates the cost, *C*, for a job completed, to the number of hours, *h*, spent at the job : $C = 45h + 50$
  Graph this relationship on the grid at right.

  (Allow graph points to be connected or not connected)

- Brandi says the equation value 50 is the slope of the graph above, but Amy says that the equation value 45 is the slope of the graph. Which girl is correct? **Explain** why, in terms of the context of the appliance repair company.

  Amy is correct. The 45 is the slope because for each increase of 1 hour, the cost increases by $45

or

Since 45 is multiplied by the variable h in the equation, this shows us the slope

or

50 can't be the slope because it indicates the y-intercept or starting point but not the steepness of the line.

Marks	Rationale
1 mark	• correctly completing bullet 1 or • partially completing bullet 2, 3, or 4
2 marks	• correctly completing bullet 1 and partially completing any two other bullets or • partially completing bullets 2, 3, and 4 or • correctly completing bullet 1 and any other bullet
3 marks	• Correctly completing any two of bullets 2, 3, and 4 or • correctly completing bullet 1 and any two other bullets or • correctly completing bullet 1 and partially completing all three other bullets
4 marks	• correctly completing bullets 2, 3, and 4 or • correctly completing bullet 1 and two other bullets, and partially completing the remaining bullet
5 marks	• correctly completing all four bullets (minor errors include not all graph points shown)

Notes:

1. No partial credit in bullet 1, both values must be correct

2. Partial credit in bullet 2 would be for determining one correct parameter in $y = mx + b$ only, or for reversing the two values, ie. $y = 5x + 7$

3. Points can be connected or not in graph for full credit in bullet 3. Partial credit would be for a reasonable sketch of a line without points or for having at least one point not fitting the linear pattern.

4. Partial credit in bullet 4 would be for choosing Amy without supporting the choice or with weak support

WR2: *(5 marks)*

- A right circular cone is shown at right, with a base radius of 6 cm and a vertical height of 14 cm. **Determine** the slant height, *s*, of the lateral surface, to the nearest 0.1 cm.

$$s^2 = 14^2 + 6^2$$
$$s^2 = 196 + 36 = 232$$
$$s = \sqrt{232} = 15.23154...$$
$$\therefore s = 15.2 \text{ cm}$$

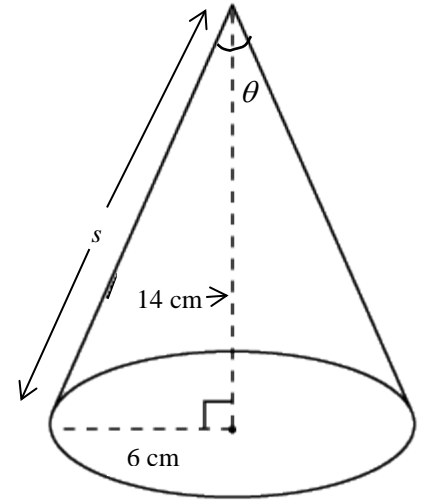- If this cone is to be built with construction paper, **determine** the total amount of paper required for all faces? (nearest 0.1 cm^2)

$$SA = \pi r^2 + \pi r s$$
$$= \pi(6)^2 + \pi(6)(15.231...)$$
$$= 400.2 \ cm^2$$

Note: If rounded value of *s* is used, SA = 399.6. Accept this answer also.

- What is the measure of the vertex angle, θ, at the top of the cone, between the slant height edges? (nearest degree)

$$\tan\left(\frac{\theta}{2}\right) = \frac{6}{14}$$
$$\frac{\theta}{2} = 23.1985..$$
$$\theta \doteq 46° = \text{ vertex angle}$$

or equivalent work using sine or cosine ratio and hypotenuse value from bullet 1

- Josee says that if her class was asked to find the volume of this cone they would not need the measure of the slant height. Is Josee correct? **Justify** your answer.

  Yes, Josee is correct. The volume formula for a cone requires the vertical height but not the slant height.

or

  Formula for volume of cone is $V = \dfrac{1}{3}\pi r^2 h$, which does not have an 's' in it.

Marks	Rationale
1 mark	• partially completing any bullet
2 marks	• correctly completing any one bullet and partially completing any other bullet or • partially completing any three bullets
3 marks	• correctly completing any two bullets or • partially completing all four bullets or • correctly completing any one bullet and partially completing the remaining three bullets
4 marks	• correctly completing any three bullets or • correctly completing any two bullets and partially completing the other two bullets
5 marks	• correctly completing all four bullets (minor errors include incorrect or lack of units once)

Notes:

1. Partial credit in bullet 1 for a correct answer without supporting work or for correct progress in Pythagorean theorem, not leading to a correct answer

2. Partial credit in bullet 2 would be for correct surface area without supporting work or for correct progress with formula, not leading to correct answer or for incorrect units or lack of units if this is the 2nd occurrence of this. Note that full credit is awarded for any surface area values between 399.6 and 400.2 depending on rounded value of *s* used.

3. Partial credit in bullet 3 would be for the correct angle without supporting work or for correct work to angle of 23º, but not to full vertex angle. Note that full credit will be given for equivalent work with any primary trig ratio leading to correct answer.

4. Partial credit in bullet 4 for indicating that Josee is correct with no explanation or an incorrect explanation. Volume formula alone earns no credit as it is on the formula sheet.
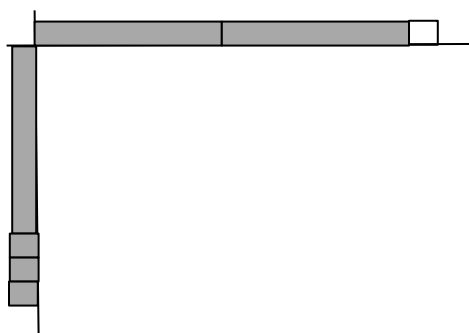
WR3: 5 marks

Use the following information to answer the next question

Legend :
☐ Shaded is positive   ☐ = 1 | = x   ☐ = x^2
☐ Blank is negative

- What two binomial factors are shown by the length and width of the algebra tile model below?

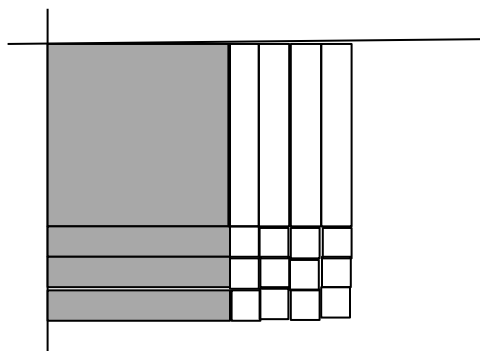_____2x-1_____   and   ___x+3_____(*in either order*)

- **Algebraically determine** the product of your factors (or area inside the frame), and simplify as far as possible.

$(2x-1)(x+3)$
$= 2x^2 + 6x - 1x - 3$
$= 2x^2 + 5x - 3$

- For the rectangular area of algebra tiles shown below, state the simplified trinomial represented, in the form $ax^2 + bx + c$, where $a,b,c \in I$.

$x^2 - x - 12$

- Kelly says that the length and width of the rectangular area in the previous bullet are $(x+4)$ and $(x-3)$. Kim says that the length and width are $(x-4)$ and $(x+3)$. Which student is correct? **Explain** your answer.

Kim is correct. Both length and width have a positive x term but one side has -4 for a constant and the other has +3 for its constant.

Note: Correct factors for bullet 4 may be drawn in diagram of bullet 3

Marks	Rationale
1 mark	• partially completing any bullet
2 marks	• correctly completing any bullet and partially completing any other bullet or • partially completing any three bullets
3 marks	• correctly completing any two bullets and partially completing any other bullet or • partially completing all four bullets or • correctly completing any one bullet and partially completing the other three bullets
4 marks	• correctly completing any three bullets or • correctly completing any two bullets and partially completing the other two bullets
5 marks	• correctly completing all four bullets (minor errors include polynomials not in standard form)

Notes:

1. Partial credit in bullet 1 would be for one correct binomial factor only or for reversing the signs on both binomial factors

2. Partial credit in bullet 2 would be for a correct answer without supporting work or for correct progress not leading to a simplified answer (Note that supporting work can include algebra tile sketching of the polynomial in bullet 2 diagram)

3. Partial credit in bullet 3 would be for at most one error in trinomial expression or for a correct unsimplified expression. Bullet 4 may be partially answered in bullet 3.

4. Partial credit in bullet 4 would be for choosing Kim without a reasonable explanation of support

Written Response 1:

1st bullet:

$$3.6^2 + 2.0^2 = c^2$$
$$c = 4.1\text{m}$$

2nd bullet:

The error Terri made was to include the πr^2 components in the formulae. This would add the surface area of 3 circles when the base of the cone and one of the end circles on the cylinder do not actually provide any surface to the bin.

3rd bullet:

$$SA = Cylinder\ Side + Circular\ Roof + Conical\ Side$$
$$SA = 2\pi rh + \pi r^2 + \pi rs$$
$$SA = 2\pi(3.6)(4.0) + \pi(3.6)^2 + \pi(3.6)(4.1)$$
$$SA = 177.56\text{m}^2$$

This bin requires $177.56m^2$ of sheet metal.
(Note: If a student incorrectly uses 3.14 as the value for pi, the result will be $177.47m^2$)

4th bullet:

$$\sigma = 2\left(\tan^{-1}\frac{3.6}{2.0}\right)$$
$$\sigma = 122°$$

OR

$$\sigma = 2\left(\sin^{-1}\frac{3.6}{4.1}\right)$$
$$\sigma = 122°$$

OR

$$\sigma = 2\left(\cos^{-1}\frac{2.0}{4.1}\right)$$
$$\sigma = 122°$$

Written Response #1 - Scoring Rubric

Bullet 1   **Full –** May use Pythagoras to directly solve or apply trig ratios twice
(Stating units is not considered vital to this bullet)
Partial - ∅

Bullet 2   **Full** – Student recognized that both extra circles were included
Partial – Student recognized only one of the two extra circles from the cylinder
or the cone were including

Bullet 3   **Full** – Following possible mistake from bullet two, if the student only removed
the one circle from the overall calculation then their result would be $300m^2$.
Partial – ∅

Bullet 4   **Full** – Proper solution with reasoning.
Partial – If they either get the half angle or the double of the compliment.

Written Response 2:

1st bullet:

$$746 \, feet \times \frac{0.305m}{1 \, feet} = 228m$$

2nd bullet:

$$228m \times \frac{1}{6000} \times \frac{100cm}{1m} = 3.8cm$$

3rd bullet:

Jason's error was that he substituted the values for the opposite and adjacent sides into each other's position.

4th bullet:

$$V = \frac{1}{3}(373)^2(435)$$
$$V = 80 \, 694 \, 820 ft^3$$

$$\frac{80 \, 694 \, 820 ft^3}{40 ft^3} = 2 \, 017 \, 371 \, stones$$

Note: The actual value was 2 017 370.5 stones so it was rounded up because you can't use half a stone without using the stone.

If the student uses the incorrect height then this would be the acceptable result:

$$V = \frac{1}{3}(373)^2(575)$$
$$V = 106 \, 665 \, 566.7 ft^3$$

$$\frac{106 \, 665 \, 566.7 ft^3}{40 ft^3} = 2 \, 666 \, 639.17 \, stones$$

Note: The actual value was 2 666 640 stones so it was rounded up because you can't use 0.17 of a stone without using the stone.

Written Response 3

- $3^{\frac{1}{2}}$ and $3^{\frac{4}{5}}$

- $3^{\frac{1}{2}} \times 3^{\frac{4}{5}} = 3^{\frac{1}{2}+\frac{4}{5}} = 3^{\frac{5}{10}+\frac{8}{10}} = 3^{\frac{13}{10}} = \sqrt[10]{3^{13}}$

- - Since 4 is a perfect square and 8 is a perfect cube
  - When entered into a calculator, you do not get any decimals (you get whole numbers) and whole numbers are rational numbers
  - 2x2=4 and 2x2x2=8
  - 4 has an two identical prime factors and 8 has an three identical prime factors

- - Yes she is correct. $16^{\frac{1}{2}} = \sqrt{16} = 4$ and $64^{\frac{2}{3}} = \sqrt[3]{64^2} = 4^2 = 16$ so therefore it is rational.
  - 16 has two identical prime factors and 64 has three identical prime factors

Written Response 3

The following identifies bullets that are considered partially correct

Bullet 1:
- Only answering one correctly

Bullet 2:
- Only one of the power or radical correct
- Adding exponents incorrectly (but must show that they were adding the exponents)
  ie. $3^{\frac{1}{2}+\frac{4}{5}} = 3^{\frac{5}{7}} = \sqrt[7]{3^5}$

Bullet 3:
- Only addressing one of the two

Bullet 4:
- Only addressing one of the two (or only one correct)
- She is correct because both can be written as fractions.

Written Response 4

- $(2x-1)$

- Area = $(2x - 1)(2x - 1)$

  $= 4x^2 - 2x - 2x + 1$

  $= 4x^2 - 4x + 1$

- Area = $(2x + 2)(5x + 2) - (4x^2 - 4x + 1)$

  $= 10x^2 + 4x + 10x + 4 - 4x^2 + 4x - 1$

  $= 6x^2 + 18x + 3$

- Area = $6(2)^2 + 18(2) + 3$

  $= 24 + 36 + 3$

  $= 63$ meters^2

Written Response 4

The following identifies bullets that are considered partially correct

Bullet 1:
- No partial

Bullet 2:
- Correct numbers wrong signs
- No credit for $4x^2 \pm 1$

Bullet 3:
- Not distributing in the negative ($6x^2 + 10x + 5$)
- Not subtracting the window ($10x^2 + 14x + 4$)
- Adding the window instead of subtracting ($14x^2 + 10x + 5$)
- Expanding the wall area incorrectly

Bullet 4:
- Not squaring the 2
- Miscalculation may or may not be considered partial

Written Response 5

The following identifies bullets that are considered partially correct

Bullet 1:

- Discrete data is identified with no explanation

Bullet 2:

- One point is plotted correctly and at least one point is potted incorrectly Points are correctly plotted and connected

Bullet 3:

- Relationship is stated as a non-linear relation but no explanation is given.
- Relationship is incorrectly stated as a linear relation but the explanation is correct
- Full credit can be given if a student incorrectly plots the points as a line in bullet 2 and then states in bullet 3 that the relation is linear based on the graph as justification.

Bullet 4:

- Only one of the two variables in the ordered pair is correctly explained.

Written Response 6

- Insert graph here

- $m = \dfrac{\Delta E}{\Delta t} = \dfrac{1650 - 1500}{100 - 0} = \dfrac{150}{100} = \dfrac{3}{2}$

This represents a 3 metre elevation change for every 2 seconds travelled

- $E(t) = 1500 + \dfrac{3}{2}t$

- Domain 0 to 500 seconds, Range is 1500 to 2250 metres.

OR

- 5.5 minutes = 330 seconds
  $E(330) = 1500 + \dfrac{3}{2}(330) = 1995m$

Written Response 7

- $60L * \dfrac{1}{4} = 15L$

- $\dfrac{\Delta C}{\Delta t} = \dfrac{45-30}{60-30} = \dfrac{15}{30} = \dfrac{1}{2} \, L/_{sec}$

- $C(t) = 15 + 0.5t$ or $2C - t - 30 = 0$
  I used the y-intercept (15 L of gas at time *t=0*) and the slope that I determined in the previous bullet to write it in $y = mx + b$ form.
  Or…
  I used the slope and one of the given points and used the point-slope formula.

- $50 = 15 + 0.5t$
  $70 = t$
  It would take 70 seconds to get 50 litres in the tank.

Written Response 8

B1   Full

x represents mass (mg) of vitamin C in one apple
y represents mass (mg) of vitamin C in one peach

Partial

Identify the meaning of x and y but do not label the graph.
Correctly label only one of x- and y-axes.
x represents apple and y represents peach (no mention of mass or vitamin C)

B2   Full

Line is drawn correctly.

Partial

One of correct slope **or** correct y-intercept only

B3   Full

Correct algebraic solution (substitution or elimination) $x = 2$, $y = 7$

Partial

one operation error
correct process, with incorrect result

B4   Full

The x value is 2 mg of vitamin C in one apple.
The y value is 2 mg of vitamin C in an apple.
Or
Explanations consistent with bullet one and refers to either mass or vitamin C (not simply number of fruit)

Partial

only answering one of the two
Explanations consistent with bullet one, but no reference to either mass or vitamin C