Newfoundland & Labrador English School District

Mathematics 2201
Final Examination
2017

Student Name: _____

Teacher Name: _____

Total Value: 70 marks   Time: 2 Hours

GENERAL INSTRUCTIONS

1. Students are required to do all items.

2. The examination consists of the following parts:

   Part I: 35 Selected Response Items   Value: 35 marks
   Part II: 15 Constructed Response Items   Value: 35 marks

3. Answers to the selected response questions for Part I are to be placed on the Student Answer Sheet provided.

4. Answers to the constructed response questions for Part II are to be placed on this paper in the spaces provided.

5. For Part II items, students are reminded to show ALL necessary steps and calculations. Partial credit may be awarded for logical work even though you might not arrive at the correct solution. Correct answers without appropriate calculations will not merit full marks.

6. A calculator may be used for calculations. Graphing calculators are to be reset before the examination begins.

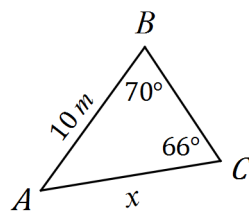7. Diagrams are not necessarily drawn to scale.

1. Which represents the appropriate equation when calculating $\angle R$?
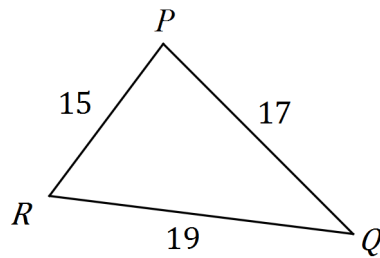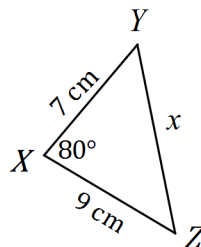

(A) $\cos R = \dfrac{15^2 + 17^2 - 19^2}{2(15)(17)}$

(B) $\cos R = \dfrac{15^2 + 19^2 - 17^2}{2(15)(19)}$

(C) $\cos R = \dfrac{15^2 + 17^2 - 19^2}{2(15)(19)}$

(D) $\cos R = \dfrac{15^2 + 19^2 - 17^2}{2(15)(17)}$

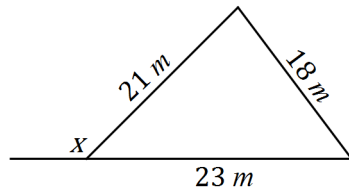2. What is the measure of x to the nearest tenth of a metre?

(A) 7.4 m
(B) 9.7 m
(C) 10.3 m
(D) 13.5 m

3. What is the measure of the missing side to the nearest tenth?


(A) 0.83 cm
(B) 3.2 cm
(C) 10.4 cm
(D) 10.9 cm

4. What is the measure of ∠x to the nearest degree?

(A) 48°
(B) 58°
(C) 122°
(D) 132°

5. Simplify: $3\sqrt{7}+7\sqrt{7}-5\sqrt{3}+2\sqrt{3}$

(A) $7\sqrt{4}$
(B) $7\sqrt{8}$
(C) $10\sqrt{7}-3\sqrt{3}$
(D) $10\sqrt{14}-3\sqrt{6}$

6. What is $4\sqrt[3]{2}$ written as an entire radical?

(A) $\sqrt[3]{8}$
(B) $\sqrt[3]{24}$
(C) $\sqrt[3]{32}$
(D) $\sqrt[3]{128}$

7. What is the restriction for $\sqrt{x-1}$?

(A) $x>0$
(B) $x\geq0$
(C) $x>1$
(D) $x\geq1$

8. Simplify: $\dfrac{\sqrt{21}}{\sqrt{6}}$

(A) $\sqrt{\dfrac{7}{2}}$

(B) $\dfrac{\sqrt{14}}{2}$

(C) $\sqrt{\dfrac{126}{6}}$

(D) $\sqrt{\dfrac{126}{36}}$

9. What is $\sqrt{48c^7z^3}$ as a mixed radical?

   (A) $4c^3z\sqrt{3cz}$
   (B) $4c^6z^2\sqrt{3cz}$
   (C) $16c^3z\sqrt{3cz}$
   (D) $16c^6z^2\sqrt{3cz}$

10. Solve for x: $\sqrt{4x+1}=5$, $x \geq -\frac{1}{4}$

    (A) 1.5
    (B) 2.25
    (C) 4
    (D) 6

11. A poll was conducted about a breakfast program and 91% of the people favoured increasing the food options. The results are considered accurate within $\pm3\%$, 19 times out of 20. What is the confidence level?

    (A) 88%
    (B) 91%
    (C) 94%
    (D) 95%

12. What percentage of the normal curve is shaded?


μ – 2σ   μ – σ   μ   μ + σ   μ + 2σ
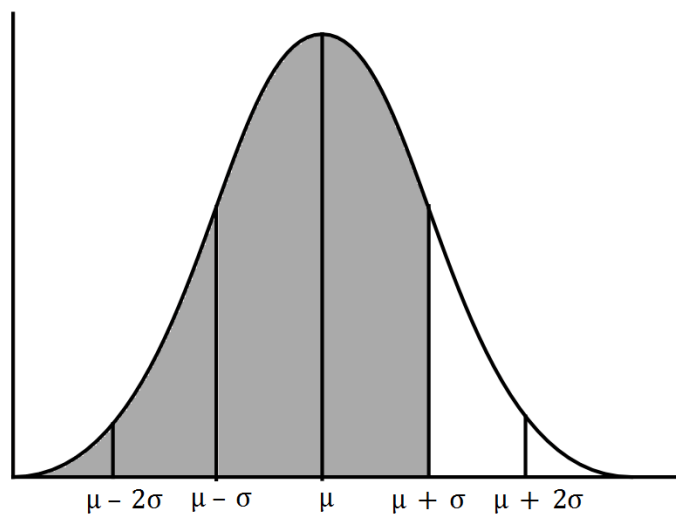
    (A) 68%
    (B) 82%
    (C) 84%
    (D) 95%

13. A company manufactures cups with a mean volume of 300 mL and a standard deviation of 1.4 mL. What percentage of cups are made that have a volume of 301 mL or greater?

    (A)   13%
    (B)   24%
    (C)   76%
    (D)   87%

14. The results of a recent math test are normally distributed with an average of 72.8% and a standard deviation of 6.4. If Jack's z-score is 1.5, what is his actual mark on this test?

    (A)   63.2%
    (B)   80.7%
    (C)   82.4%
    (D)   93.3%

15. Given the graph of the quadratic function, $f(x) = ax^2 + bx + c$, which is true?
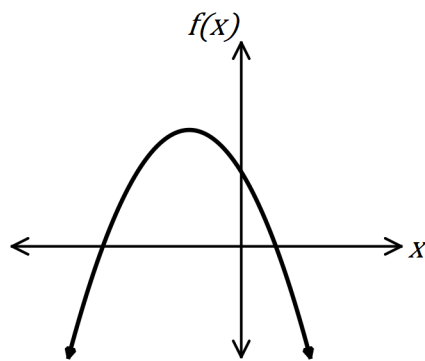
    (A) $a > 0$, $c > 0$
    (B) $a > 0$, $c < 0$
    (C) $a < 0$, $c > 0$
    (D) $a < 0$, $c < 0$

16. Which graph represents the function $f(x)=-3(x-3)(x+2)$?

(A)

(B)

(C)

(D)
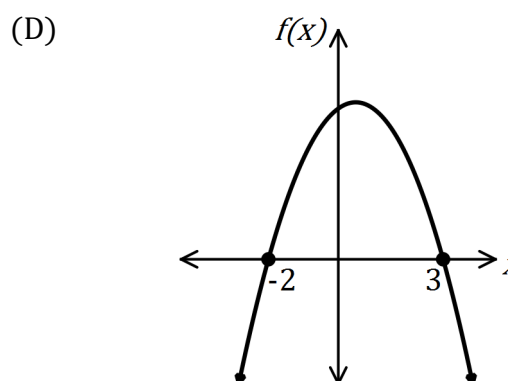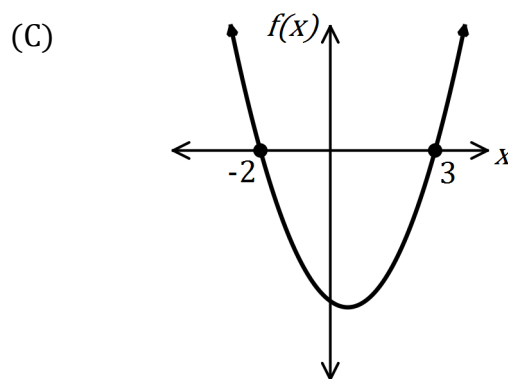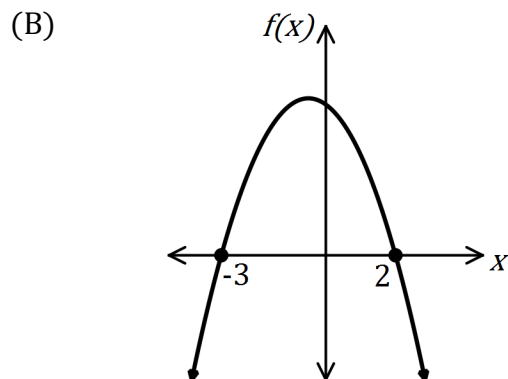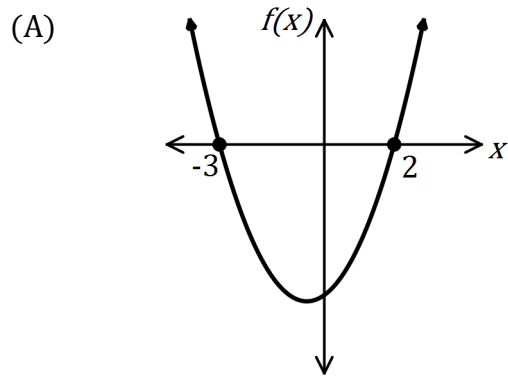
17. What is the equation of the axis of symmetry for the function $f(x)=-3x^2-6x+7$?
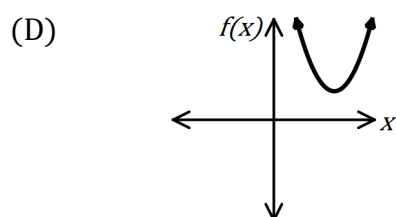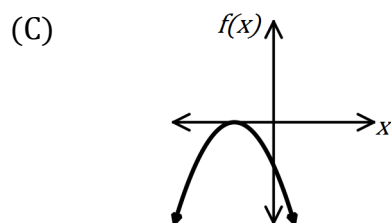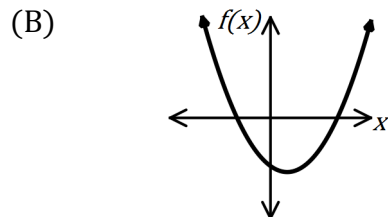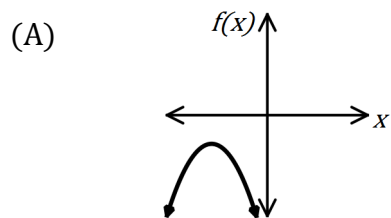
(A) $x=-2$
(B) $x=-1$
(C) $x=1$
(D) $x=2$

18. What is the range of the quadratic function $y = \frac{1}{3}(x+4)^2 - 7$?

    (A) $\{y \le -7, y \in R\}$

    (B) $\{y \ge -7, y \in R\}$

    (C) $\{y \le -4, y \in R\}$

    (D) $\{y \ge -4, y \in R\}$
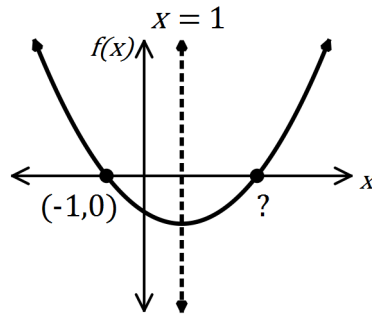
19. What is the y-intercept of the function $f(x) = -2(x+1)(x-4)$?

    (A) $(0, -8)$

    (B) $(0, -4)$

    (C) $(0, 4)$

    (D) $(0, 8)$

20. Which graph represents a function that has an equation with roots $1 \pm \sqrt{7}$?

    (A)

    (B)

    (C)

    (D)

21. A quadratic function has an axis of symmetry $x = 1$. One of the x-intercepts is at $(-1,0)$. What is the other x-intercept?

(A) $(-3,0)$

(B) $(0,0)$

(C) $(1,0)$

(D) $(3,0)$

22. What are the zeros of the function $y = 5x^2 - 20x$?

(A) $x = -5,\ 4$

(B) $x = -2,\ 2$

(C) $x = 0, -4$

(D) $x = 0,\ 4$

23. Which equation has roots $x = -5$ and $x = 2$?

(A) $0 = x^2 + 3x - 10$

(B) $0 = x^2 - 7x + 10$

(C) $0 = x^2 - 3x - 10$

(D) $0 = x^2 + 7x + 10$

24. Simply: $\dfrac{-3 \pm \sqrt{45}}{3}$

(A) $-1 \pm \sqrt{5}$

(B) $-1 \pm 3\sqrt{5}$

(C) $1 \pm \sqrt{5}$

(D) $1 \pm 3\sqrt{5}$

25. The graph below shows the temperature over a 24 hour period. Which time interval had the greatest rate of change in temperature?
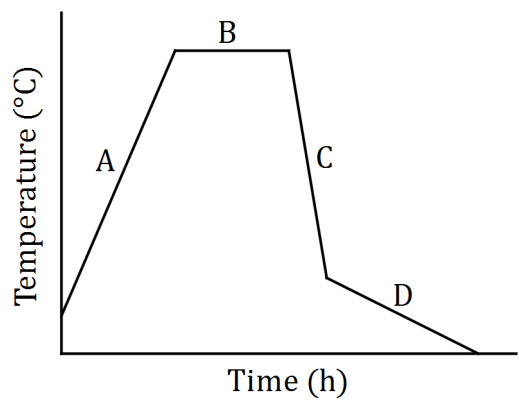
(A) A
(B) B
(C) C
(D) D

26. The volume of a sphere is 300 mm³. The sphere enlarges to a new volume of 4687.5 mm³. By what scale factor has the radius of the sphere increased?

(A) 2.5
(B) 3.95
(C) 6.25
(D) 15.625

27. Given the distance travelled during a set time, which car travelled the fastest?

	Car	Distance (km)	Time (min)
(A)	A	40	25
(B)	B	60	40
(C)	C	80	55
(D)	D	100	70

28. Jody needs 48 burgers for a school BBQ and wants to spend the least amount of money possible. When she purchases the burger packs, all of them must be the same size (she cannot mix and match different pack sizes). Which would be the best choice?

	Burger Pack Size	Cost Per Pack
(A)	10	$4.50
(B)	20	$7.00
(C)	80	$26.00
(D)	100	$30.00

29. What would be a counter-example for the conjecture shown below?

Conjecture: All students study Math.

Counter-Example
(A) John is not a student.
(B) John is studying Math.
(C) John's schedule is English, Biology, Chemistry and History.
(D) John's schedule is English, Math, Biology and Chemistry.

30. Given this algebraic proof, what conjecture is proven?

$$(2n+1)+(2m+1)$$
$$=2n+2m+2$$
$$=2(n+m+1)$$

(A) Two odd numbers can be added together.
(B) The sum of odd numbers is greater than $2n$.
(C) The sum of two odd numbers will be even.
(D) The sum of two odd numbers will be odd.

31. Jane uses the Pythagorean Theorem with $\triangle ABC$. What conclusion can Jane draw from her calculations?
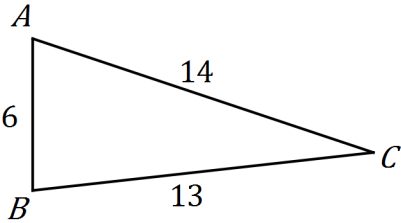

$$6^2 + 13^2 = 14^2$$
$$36 + 169 = 196$$
$$205 = 196$$

(A) $\triangle ABC$ is a right triangle.
(B) $\triangle ABC$ is not a right triangle.
(C) The sum of the square of the two shorter sides is always greater than the square of the other side.
(D) The sum of the square of the two shorter sides is always less than the square of the other side.

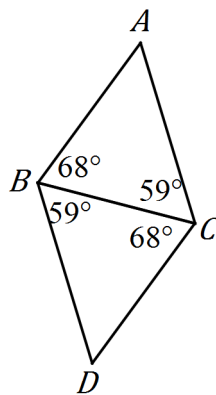32. What is a valid reason for $\angle C$ being congruent to $\angle F$?
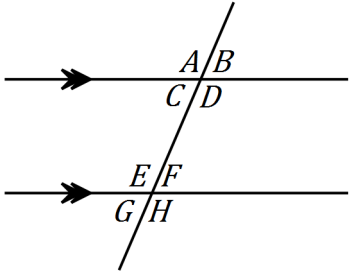
(A) alternate exterior
(B) alternate interior
(C) corresponding
(D) vertically opposite

33. What calculation could you use to get the sum of the angles in a pentagon?
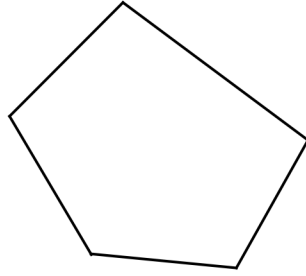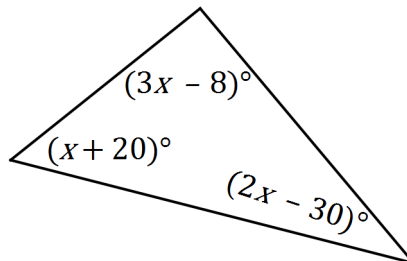

    (A) $S = 3 \times 180°$

    (B) $S = 3 \times 360°$

    (C) $S = 5 \times 180°$

    (D) $S = 5 \times 360°$

34. What relationship can be used to prove $\triangle ABC \cong \triangle DCB$?

    (A)   ASA

    (B)   SAS

    (C)   SSA

    (D)   SSS

35. What is the measure of the smallest angle?

    (A)   27°

    (B)   33°

    (C)   36°

    (D)   53°

Answer **ALL** items in the space provided. Show **ALL** workings.

Value

2   36.   Calculate the perimeter of $\triangle ABC$ to the nearest tenth.
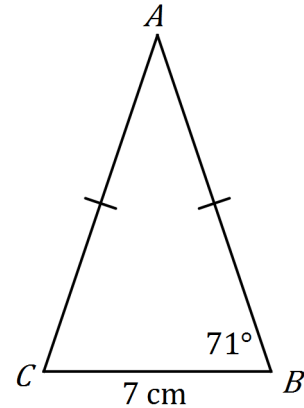
2   37.(a) Simplify: $\sqrt{75} + 7\sqrt{5} - 8\sqrt{3} - \sqrt{45}$

2   37.(b) Simplify: $\left(\sqrt{20}+\sqrt{6}\right)\left(3\sqrt{12}-5\sqrt{12}\right)$

2   37.(c) A square is inscribed in a circle. Determine the exact radius, r, of the circle if the perimeter of the square is $20\sqrt{6}$ cm.
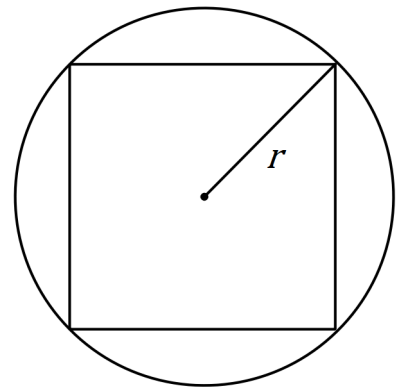
2   38.(a) Calculate the standard deviation for the data set. Show your work.

<div align="center">

10   8   11   12   9

</div>

Value

2   38.(b) Students go on a trip and must have their bags weighed. The mean weight of each bag is 18 kg with a standard deviation of 3.5 kg. The frequency graph of the weight of the bags is shown below. On the return trip, the contents of each bag remains the same but each student has a 2.4 kg gift that is added to their bag. Describe how the addition of the gift to each bag affects the mean, standard deviation and shape of the graph. Sketch the new graph.
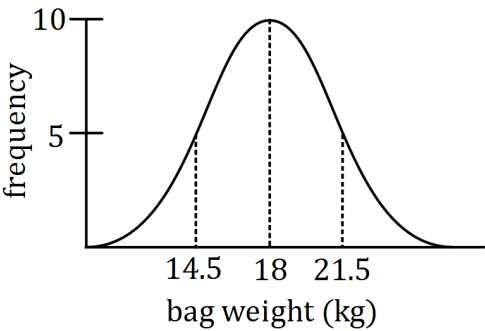
How does it affect the mean?	
How does it affect the standard deviation?	
How does it affect the shape?	

bag weight (kg)

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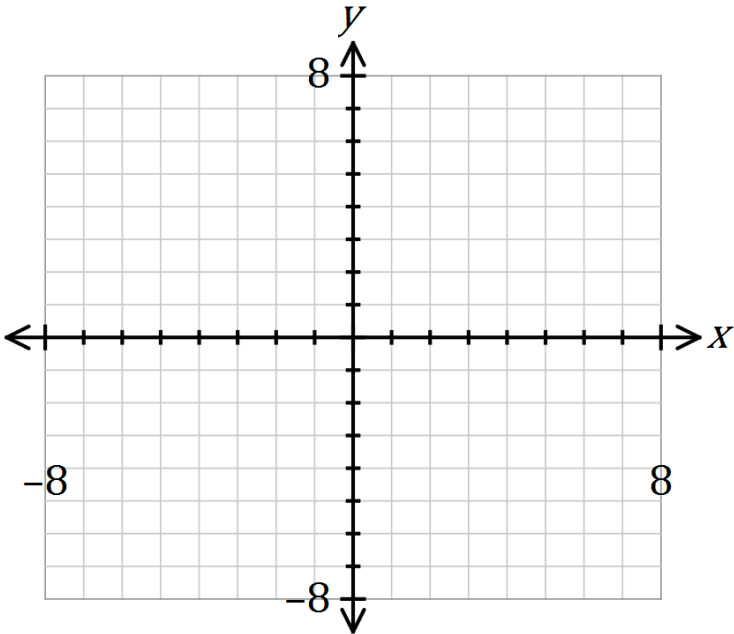
Value

4   39.(a) Given the function of $y = (x+3)(x-1)$, determine the following:

         (i)   Coordinates of the *x*-intercept(s): _____

         (ii)   Coordinate of the y-intercept: _____

         (iii)   Vertex of the function: _____

         (iv)   Sketch the graph of the function:

2   39.(b) A soccer ball is kicked from the ground 8 m from the net. The ball reaches a maximum height of 6 m at a horizontal distance of 5 m from where it was kicked. Algebraically determine a quadratic function that represents this situation, and use the function to determine if the ball will go into the soccer net.
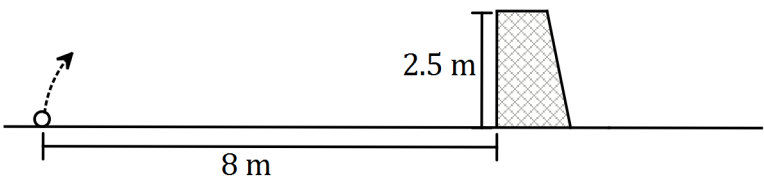
Value

4   40.(a) A brick border, of uniform width, is added to a driveway. The border is on three sides of the driveway because a sidewalk runs in front of the driveway. The driveway measures 10 ft by 20 ft and the combined area of the driveway and border is 308 ft². Algebraically determine the quadratic function that represents this situation, and use it to find the width of the brick border.
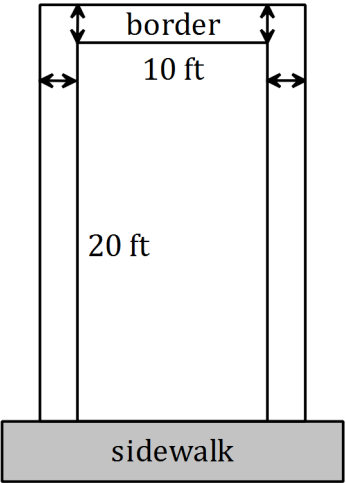
2   40.(b) The product of two consecutive, odd whole numbers is 35. Use a quadratic equation to algebraically determine the two numbers.

Value

2   41.   A scale model has a surface area of 20 cm² and a volume of 125 cm³.
Calculate the volume of the original object if its surface area is 80 cm².

42.   Jason makes a conjecture that his number trick results in a number that is the
same as the original number.

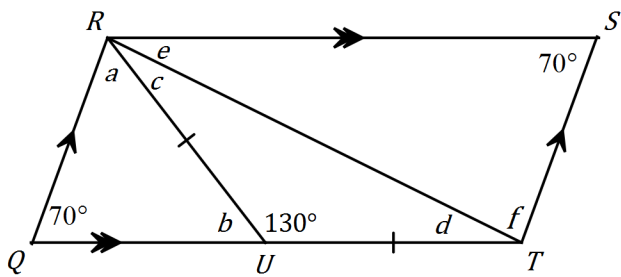| Number Trick |
| --- |
| Choose a number. |
| Triple it. |
| Subtract 8. |
| Add the number you started with. |
| Divide by 4. |
| Add 2. |

2&2

| (a) Use inductive reasoning to support Jason's conjecture (provide two examples).	(b) Use deductive reasoning to prove that his conjecture holds true for any number, *n*.

Value

3   43.(a) Find the missing angle measures in the diagram.

angle measures
$a =$
$b =$
$c =$
$d =$
$e =$
$f =$

2   43.(b) If $\angle A = (x^2 + 30)^\circ$ and $\angle B = (11x + 6)^\circ$, algebraically determine the value for x which makes $\angle A$ and $\angle B$ acute.

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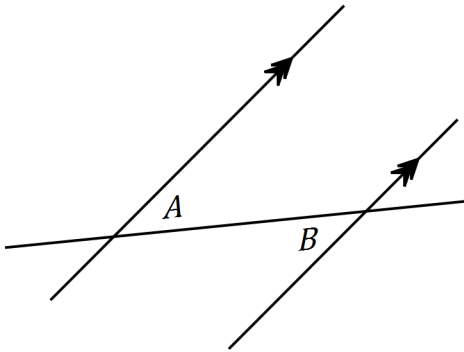
Mathematics 2201 Examination
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Student Answer Sheet

Student Name: _____

Teacher Name: _____

1.		8.		15.		22.		29.	
2.		9.		16.		23.		30.	
3.		10.		17.		24.		31.	
4.		11.		18.		25.		32.	
5.		12.		19.		26.		33.	
6.		13.		20.		27.		34.	
7.		14.		21.		28.		35.	