



**Mathematics 2201**  
**Common Mathematics Assessment**  
**Sample 2013**

Name: \_\_\_\_\_

Mathematics \_\_\_\_\_

Teacher: \_\_\_\_\_

28 Selected Response  
13 Constructed Response

28 marks  
42 marks

**FINAL**

70 Marks

**TIME: 2 HOURS**

**NOTE**

Diagrams are not necessarily drawn to scale.

**FORMULAE**

$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$	$a^2 = b^2 + c^2 - 2bc \cos A$	$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$
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$\sigma = \sqrt{\frac{\sum(x - \bar{x})^2}{n}}$	$z = \frac{x - \mu}{\sigma}$	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
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**Selected Response:** Choose the appropriate response on the answer sheet or SCANTRON.

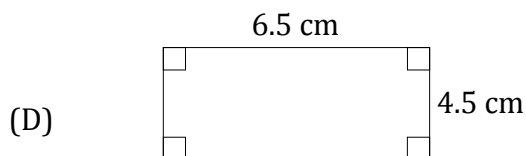
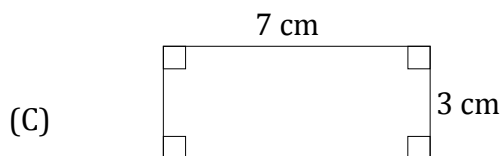
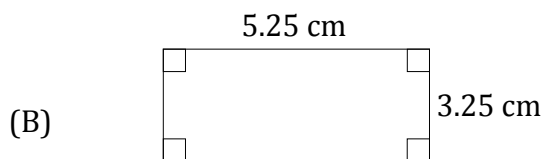
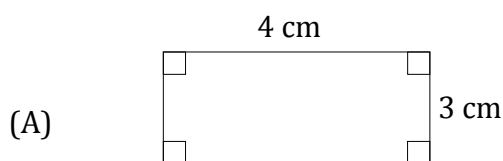
1. Lisa draws four parallelograms and measures all sides. She writes the statement *“The opposite sides of a parallelogram are equal”* in her notebook. Which term best describes her statement?

(A) conjecture  
(B) counterexample  
(C) deductive reasoning  
(D) inductive reasoning

2. What is the missing seventh term in the given sequence?  $\{1, 1, 2, 3, 5, 8, \underline{\quad}, 21\}$

(A) 11  
(B) 12  
(C) 13  
(D) 14

3. Which figure is a counterexample to the statement below?  
*“The perimeter of a rectangle is never an odd number.”*



4. If  $\angle 1 = \angle 2$  and  $\angle 1 = \angle 3$ , which property proves that  $\angle 2 = \angle 3$ ?

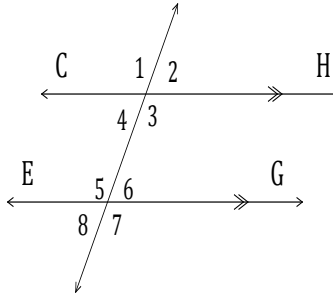
(A) commutative  
(B) supplementary angles  
(C) transitive  
(D) vertically opposite angles

5. What is the sum of the interior angles of a convex polygon with 14 sides?

- (A) 2160°
- (B) 2340°
- (C) 2520°
- (D) 2880°

6. An incorrect solution is provided to the question below. In which step did the **first** error occur?

Question: Given  $CH \parallel EG$  and  $\angle 1 = 120^\circ$ , what is the measure of  $\angle 7$ ?

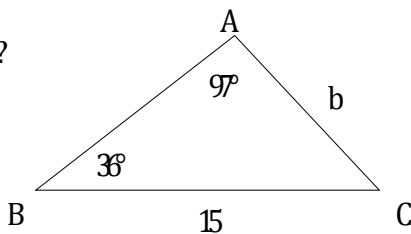


Solution:

- Step 1:  $\angle 1 = \angle 3$
- Step 2:  $\angle 3 = \angle 6$
- Step 3:  $\angle 7 = 180^\circ - \angle 6$
- Step 4:  $\angle 7 = 180^\circ - 120^\circ = 60^\circ$

- (A) 1
- (B) 2
- (C) 3
- (D) 4

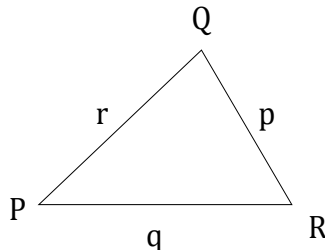
7. What is the length of side  $b$ ?



- (A) 8.9
- (B) 11.1
- (C) 18.7
- (D) 25.3

8. Which expression is equal to  $\sin Q$ ?

- (A)  $\frac{q}{r \sin R}$
- (B)  $\frac{r}{q \sin R}$
- (C)  $\frac{q \sin R}{r}$
- (D)  $\frac{r \sin R}{q}$



9. Simplify completely:  $12\sqrt{40} - 7\sqrt{10}$

- (A)  $5\sqrt{30}$
- (B)  $17\sqrt{10}$
- (C)  $19\sqrt{30}$
- (D)  $41\sqrt{10}$

10. Simplify completely:  $\frac{5\sqrt{15}}{2\sqrt{6}}$

- (A)  $\frac{5\sqrt{10}}{4}$
- (B)  $\frac{15\sqrt{10}}{4}$
- (C)  $\frac{5\sqrt{90}}{12}$
- (D)  $\frac{10\sqrt{90}}{24}$

11. Simplify completely:  $\sqrt{27x^2}$

- (A)  $3x\sqrt{3}$
- (B)  $3x^2\sqrt{3}$
- (C)  $9x\sqrt{3}$
- (D)  $9x^2\sqrt{3}$

12. Write  $2y^3\sqrt[3]{3y}$  as an entire radical.

- (A)  $\sqrt[3]{12y^3}$
- (B)  $\sqrt[3]{24y^2}$
- (C)  $\sqrt[3]{24y^4}$
- (D)  $\sqrt[3]{54y^4}$

13. Brad was asked to simplify  $2\sqrt[3]{64x^5}$  but did not complete a correct solution. Which step contains his **first** error?

*Solution:*

Step 1:  $2 \cdot \sqrt[3]{64} \cdot \sqrt[3]{x^5}$

Step 2:  $2 \cdot 8 \cdot \sqrt[3]{x^3} \cdot \sqrt[3]{x^2}$

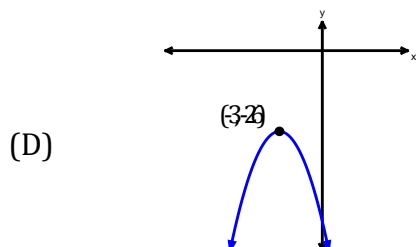
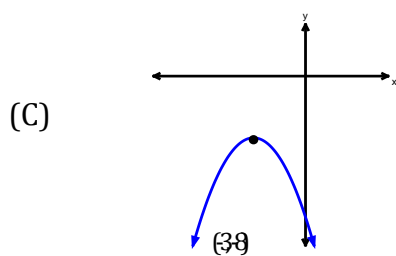
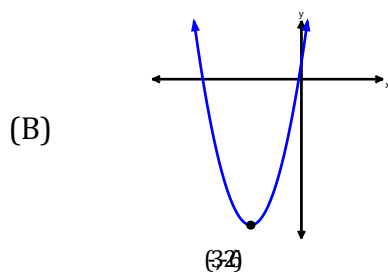
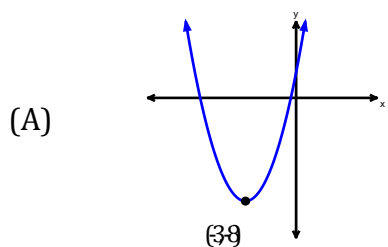
Step 3:  $2 \cdot 8 \cdot x \cdot \sqrt[3]{x^2}$

Step 4:  $18x\sqrt[3]{x^2}$

- (A) 1
- (B) 2
- (C) 3
- (D) 4

14. What are the restrictions on the variable for  $\frac{1}{\sqrt{x-1}}$  ?
- (A)  $x \leq 1$   
(B)  $x \geq 1$   
(C)  $x < 1$   
(D)  $x > 1$
15. Which set of data has the lowest standard deviation?
- (A)  $\{0.1, 0.2, 0.3, 0.4, 0.5\}$   
(B)  $\{3.5, 3.6, 3.7, 3.8, 3.9\}$   
(C)  $\{4, 4, 5, 5, 6\}$   
(D)  $\{9, 9, 9, 9, 9\}$
16. The ages of participants in a curling bonspiel are normally distributed with a mean of 45 years and a standard deviation of 9 years. What percent of the curlers are between 36 and 54 years of age?
- (A) 34%  
(B) 68%  
(C) 95%  
(D) 99%
17. The heights of all students in a class were measured. It was later discovered that the tape measure used was inaccurate and 5 mm had to be added to each person's height. Which calculation would stay the same based on the new height measures?
- (A) central tendency  
(B) mean  
(C) median  
(D) standard deviation
18. What are the domain and range for  $y = 3(x - 1)^2 + 4$  ?
- (A)  $x \in R$  and  $y \leq 4$   
(B)  $x \in R$  and  $y \geq 4$   
(C)  $x \leq 1$  and  $y \in R$   
(D)  $x \geq 1$  and  $y \in R$
19. A quadratic function has an x-intercept at  $(-7, 0)$  and an axis of symmetry at  $x = -1$ . What is the other x-intercept?
- (A)  $(-13, 0)$   
(B)  $(-4, 0)$   
(C)  $(5, 0)$   
(D)  $(9, 0)$
20. If  $(-1, 3)$  is the vertex of  $y = 2x^2 + bx + 5$ , what is the value of  $b$  ?
- (A)  $-12$   
(B)  $-4$   
(C)  $4$   
(D)  $12$

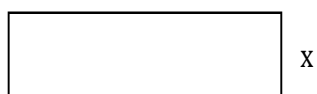
21. The function  $y = x^2 + 6x + 1$  has an axis of symmetry at  $x = -3$ . Which graph best models this function?



22. Which represents a quadratic function with no x-intercepts?

- (A)  $y = -(x - 1)^2$   
 (B)  $y = -(x - 1)^2 + 3$   
 (C)  $y = (x + 1)^2 - 3$   
 (D)  $y = (x + 1)^2 + 3$

23. A gardener has 120 m of fencing to mark off a rectangular vegetable garden. Which function could be used to determine the dimensions that will result in the maximum area?



- (A)  $A = x(x - 60)$   
 (B)  $A = x(x - 120)$   
 (C)  $A = x(60 - x)$   
 (D)  $A = x(120 - x)$

24. Which function has zeros of  $-3$  and  $7$  ?

- (A)  $f(x) = (x - 3)(x - 7)$
- (B)  $f(x) = (x - 3)(x + 7)$
- (C)  $f(x) = (x + 3)(x - 7)$
- (D)  $f(x) = (x + 3)(x + 7)$

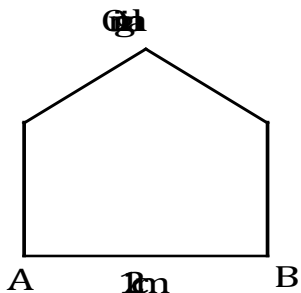
25. What are the roots of the quadratic equation  $x^2 + 6x - 16 = 0$  ?

- (A)  $x = -8, x = -2$
- (B)  $x = -8, x = 2$
- (C)  $x = 8, x = -2$
- (D)  $x = 8, x = 2$

26. Which has a unit rate of  $\$0.16/\text{apple}$ ?

- (A) 20 apples for  $\$3.00$
- (B) 25 apples for  $\$4.25$
- (C) 30 apples for  $\$4.95$
- (D) 35 apples for  $\$5.60$

27. The pentagon shown is transformed by a scale factor of  $\frac{1}{4}$ . What is the length of the image of side AB?



- (A) 3 cm
- (B) 9 cm
- (C) 15 cm
- (D) 48 cm

28. A partially inflated heart-shaped balloon is 15 cm wide and has a volume of  $1600 \text{ cm}^3$ . If air is added until the balloon is 30 cm wide, what is the new volume?

- (A)  $3200 \text{ cm}^3$
- (B)  $6400 \text{ cm}^3$
- (C)  $9600 \text{ cm}^3$
- (D)  $12800 \text{ cm}^3$

**Constructed Response:**

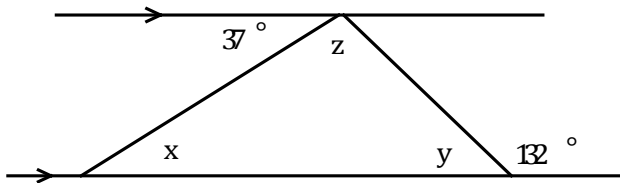
Answers to be written on this paper in the space provided. Show all workings.

29. Use **both** inductive and deductive reasoning to show that the sum of two odd integers is an even number. 4 marks

Inductive Reasoning

Deductive Reasoning

30. Find the measure of each indicated angle. Justify your answer. 3 marks

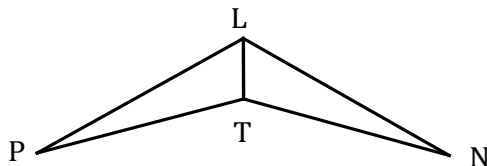


Angle Measure	Justification
$x =$ _____	_____
$y =$ _____	_____
$z =$ _____	_____

31. Use either a paragraph or two-column format to complete the given proof: 3 marks

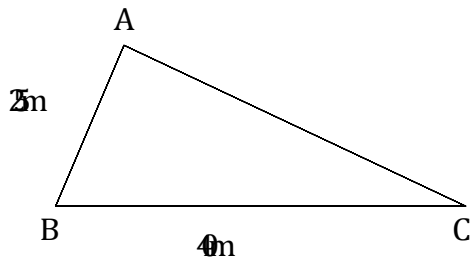
Given:  $LT$  bisects  $\angle PLN$   
 $\angle PTL = \angle NTL$

Prove:  $LP = LN$





32. Peter uses exactly 100 m of string to stake out the triangular plot shown in his back garden. Find the measures of all three angles, to the nearest degree. 4 marks



33. Simplify:  $(3\sqrt{2} - \sqrt{10})^2$  3 marks

34. State the **restrictions** on  $x$ , **solve** the equation, and **check** for extraneous roots. 4 marks

$$4 - \sqrt{2x + 1} = 9$$

Restrictions: \_\_\_\_\_

Solution: \_\_\_\_\_

35. In a pre-election survey in St. John's, 32% of those surveyed were undecided about their choice for mayor. The survey is considered accurate within 8 percentage points, 99 times out of 100. If there are 102 000 eligible voters in St. John's, state the **range** of the number of people who are undecided and the **confidence level**. 2 marks

Range\_\_\_\_\_

Confidence Level\_\_\_\_\_

36. A manufacturer produces tires that have an average thickness of 179 mm, with a standard deviation of 0.9 mm. To be classified as "supreme quality", tires must have a thickness between 177.8 mm and 180.7 mm. What percent, to the nearest whole number, of the total production can be rated as "supreme quality" tires? 3 marks

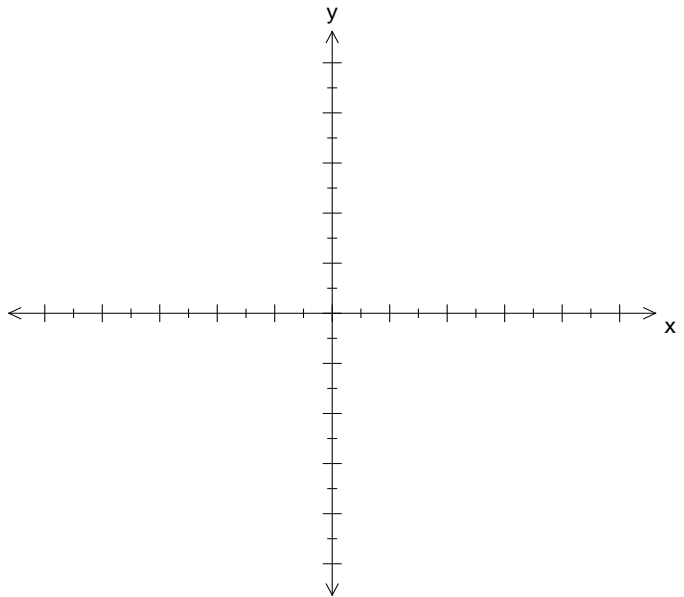
37. A model rocket is launched from its launch pad which is 15 m above the ground. It takes 2 seconds for the rocket to reach a maximum height of 35 m. Algebraically determine the quadratic function in the form  $y = a(x - h)^2 + k$ , that models the path followed by the rocket, and use it to determine the height of the rocket at 3.5 s. 3 marks

Function\_\_\_\_\_

Height\_\_\_\_\_

38. Algebraically determine the **vertex** and **x-intercepts** for the function  $y = -x^2 - 4x + 5$ . Sketch the graph, labelling all key points.

3 marks



39. Solve the given equation. State the solution(s) in **exact** form.

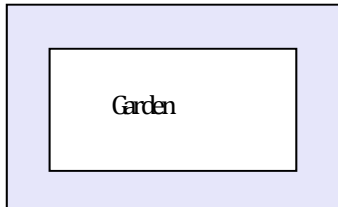
3 marks

$$12x = -5x^2 - 1$$

40. Use a quadratic function to model and solve the given problem:

4 marks

A landscaper is designing a 6 m by 8 m rectangular garden that will then be surrounded by a uniform border of crushed stone. She has enough crushed stone to cover  $72 \text{ m}^2$ . What is the width of the border if she uses all of the crushed stone?



41. Nicole designed a rectangular crest that was 8 cm by 10 cm for her school's jacket. The crest was then enlarged to create a poster that had an area of  $980 \text{ cm}^2$ . What are the dimensions of the poster?

3 marks

Mathematics 2201  
Common Mathematics Assessment – Sample 2013

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Name: \_\_\_\_\_

Mathematics Teacher: \_\_\_\_\_

- |     |   |   |   |   |     |   |   |   |   |
|-----|---|---|---|---|-----|---|---|---|---|
| 1.  | A | B | C | D | 15. | A | B | C | D |
| 2.  | A | B | C | D | 16. | A | B | C | D |
| 3.  | A | B | C | D | 17. | A | B | C | D |
| 4.  | A | B | C | D | 18. | A | B | C | D |
| 5.  | A | B | C | D | 19. | A | B | C | D |
| 6.  | A | B | C | D | 20. | A | B | C | D |
| 7.  | A | B | C | D | 21. | A | B | C | D |
| 8.  | A | B | C | D | 22. | A | B | C | D |
| 9.  | A | B | C | D | 23. | A | B | C | D |
| 10. | A | B | C | D | 24. | A | B | C | D |
| 11. | A | B | C | D | 25. | A | B | C | D |
| 12. | A | B | C | D | 26. | A | B | C | D |
| 13. | A | B | C | D | 27. | A | B | C | D |
| 14. | A | B | C | D | 28. | A | B | C | D |