# Math 2201 Review (2013 Sample/2013 Exam)

| | | |
|---|---|---|
| $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ | $a^2 = b^2 + c^2 - 2bc\cos A$ | $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$ |
| $\sigma = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n}}$ | $z = \frac{x - \mu}{\sigma}$ | $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ |

**2013 Sample Exam**

**Selected Response:** Choose the appropriate response on the answer sheet or SCANTRON.

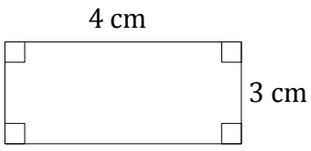
1. Lisa draws four parallelograms and measures all sides. She writes the statement *"The opposite sides of a parallelogram are equal"* in her notebook. Which term best describes her statement?

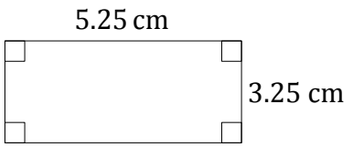
   (A) conjecture
   (B) counterexample
   (C) deductive reasoning
   (D) inductive reasoning

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

   (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."*

   (A)
   
   

   (B)
   
   

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   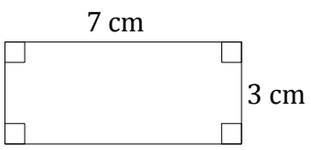
   

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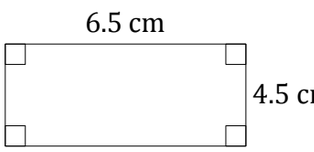
   
   

4. If $\angle 1 = \angle 2$ and $\angle 1 = \angle 3$, which property proves that $\angle 2 = \angle 3$ ?

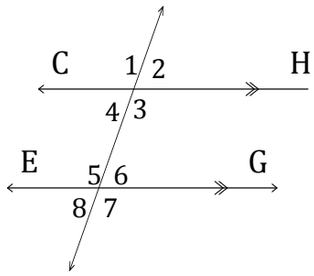
(A) commutative
(B) supplementary angles
(C) transitive
(D) vertically opposite angles

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?

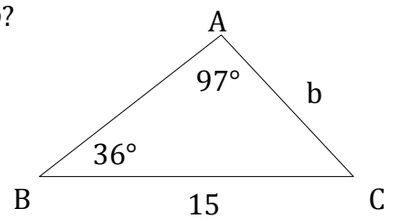
Question: Given $CH \parallel EG$ and $\angle 1 = 120°$, what is the measure of $\angle 7$?




Solution:
Step 1: $\angle 1 = \angle 8$
Step 2: $\angle 8 = \angle 6$
Step 3: $\angle 7 = 180° - \angle 6$
Step 4: $\angle 7 = 180° - 120° = 60°$

(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

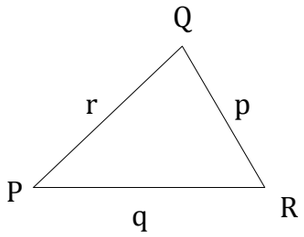
8. Which expression is equal to $\sin Q$ ?

(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: $\dfrac{5\sqrt{15}}{2\sqrt{6}}$

(A) $\dfrac{5\sqrt{10}}{4}$

(B) $\dfrac{15\sqrt{10}}{4}$

(C) $\dfrac{5\sqrt{90}}{12}$

(D) $\dfrac{10\sqrt{90}}{24}$

11. Simplify completely: $\sqrt{27x^8}$

(A) $8x\sqrt{8}$
(B) $3x^2\sqrt{3}$
(C) $9x\sqrt{8}$
(D) $9x^2\sqrt{3}$

12. Write $2y\sqrt[3]{8y}$ as an entire radical.

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

13. Brad was asked to simplify $2\sqrt[3]{64x^8}$ but did not complete a correct solution. Which step contains his **first** error?

*Solution:*

*Step 1:* $2 \cdot \sqrt[3]{64} \cdot \sqrt[3]{x^8}$
*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 $\dfrac{1}{\sqrt{x-1}}$ ?

(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% (C) 95 %
(B) 68% (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?

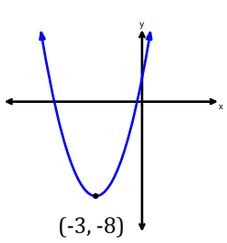
(A) $(-13, 0)$
(B) $(-4, 0)$
(C) $(5, 0)$
(D) $(9, 0)$

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?

(A)

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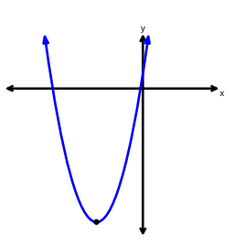
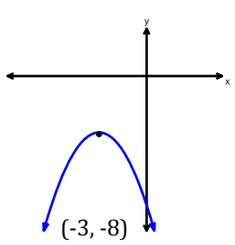
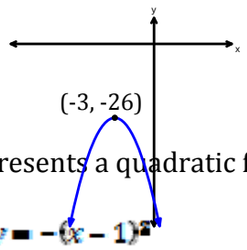



(C)



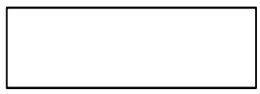
(D)




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

(A) $y = -(x-1)^2$
(B) $y = -(x-1)^2 + 8$
(C) $y = (x+1)^2 - 9$
(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) $f(x) = (x+3)(x+7)$

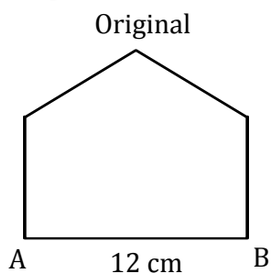
25. What are the roots of the quadratic equation $x^2 + 6x - 16 = 0$ ?

(A) $x = -8, x = -2$
(B) $x = -6, x = 2$
(C) $x = 8, x = -2$
(D) $x = 8, x = 2$

26. Which has a unit rate of \$0.16/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) 15cm
(D) 48 cm

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

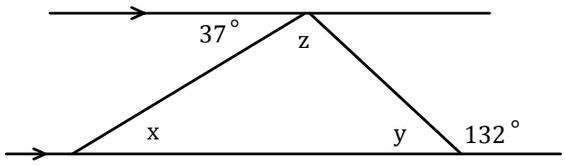
(A) 3200 $cm^3$
(B) 6400 $cm^3$
(C) 9600 $cm^3$
(D) 12 800 $cm^3$

**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

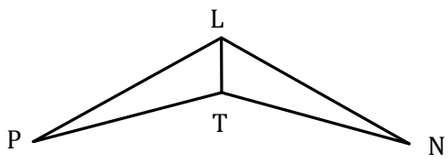
30. Find the measure of each indicated angle. Justify your answer. 3 marks



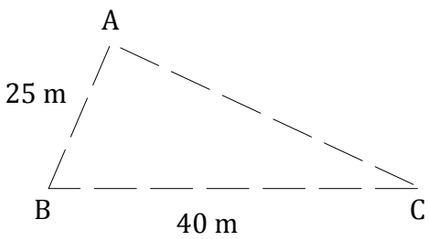

31. Use either a paragraph or two-column format to complete the given proof: 3 marks

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: $\left(3\sqrt{2} - \sqrt{10}\right)^6$ 3 marks

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

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

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

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. 3 marks

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.

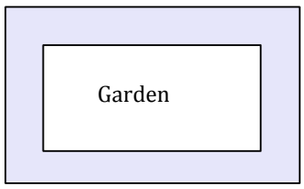
38. Algebraically determine the **vertex** and **x-intercepts** for the function $y = -x^2 - 4x + 5$. Sketch the graph, labelling all key points. 3 marks

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 $5\ m$ rectangular garden that will then be surrounded by a uniform border of crushed stone. She has enough crushed stone to cover $72\ m^2$. What is the width of the border if she uses all of the crushed stone?




**2013 Exam**

**Selected Response:** Choose the appropriate response on the answer sheet or SCANTRON.

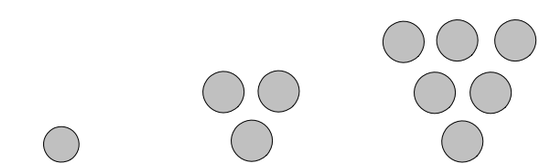
1. What is a statement that is believed to be true but not yet proven?

(A) Conjecture
(B) Counterexample
(C) Deductive Reasoning
(D) Inductive Reasoning

2. Which is a counterexample to the statement "The sum of two consecutive integers is always greater than each of the two integers"?

(A) $-4 + (-5) = -9$
(B) $4 + (-5) = -1$
(C) $-4 + 5 = 1$
(D) $4 + 5 = 9$

3. How many circles are in the **5th diagram** in the sequence below:



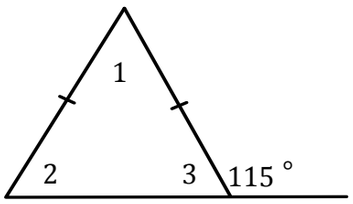
1st Diagram 2nd Diagram 3rd Diagram

(A) 9
(B) 10
(C) 14
(D) 15

4. If two non-parallel lines are cut by a transversal, which pair of angles is always equal?

(A) Alternate Interior
(B) Corresponding
(C) Supplementary
(D) Vertically Opposite

5. A student was asked to find the measure of $\angle 1$ . In which step did he make the first error?




*Solution*

*Step 1:* $\angle 3 = 180^\circ - 115^\circ$

*Step 2:* $\angle 3 = 65^\circ$

*Step 3:* $\angle 1 = \angle 3$

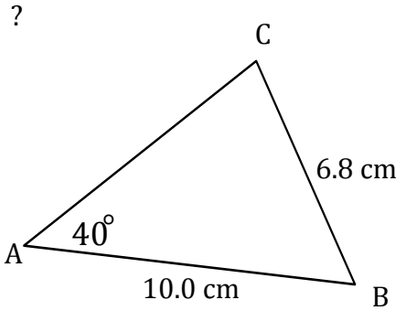
*Step 4:* $\angle 1 = 65^\circ$

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

6. How many sides does a convex polygon have if the sum of its interior angles is $1440^\circ$ ?

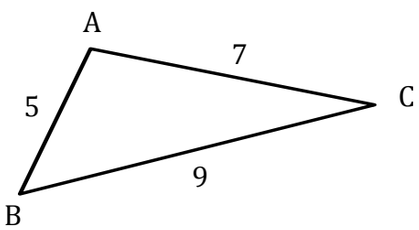
(A) 4
(B) 6
(C) 8
(D) 10

7. What is the measure of $\angle C$ ?




(A) $20^\circ$
(B) $26^\circ$
(C) $69^\circ$
(D) $71^\circ$

8. Which equals the measure of $\angle A$ ?




(A) $\cos^{-1}\left(\frac{5^2+9^2-7^2}{2(5)(9)}\right)$

(B) $\cos^{-1}\left(\frac{7^2+5^2-9^2}{2(7)(5)}\right)$

(C) $\cos^{-1}\left(\frac{9^2+5^2-7^2}{2(9)(5)}\right)$

(D) $\cos^{-1}\left(\frac{9^2+7^2-5^2}{2(9)(7)}\right)$

9. Simplify completely: $5\sqrt{7}+3\sqrt{28}$

(A) $11\sqrt{7}$
(B) $17\sqrt{7}$
(C) $11\sqrt{14}$
(D) $8\sqrt{35}$

10. Simplify completely: $\sqrt[3]{-8x^{17}}$

(A) $-2x^3\sqrt[3]{x^5}$
(B) $-2x^5\sqrt[3]{x^3}$
(C) $2x\sqrt[3]{-2x^5}$
(D) $2x^5\sqrt[3]{-2x}$

11. Write $3x^3\sqrt{5x}$ as an entire radical.

(A) $\sqrt{15x^4}$
(B) $\sqrt{15x^7}$
(C) $\sqrt{45x^4}$
(D) $\sqrt{45x^7}$

12. A student was asked to simplify $\frac{x\sqrt{18x^3}}{3}$ but did not complete a correct solution. Which step contains her first error?

*Solution:*

*Step 1:* $\frac{x\sqrt{9\cdot 2\cdot x^2\cdot x}}{3}$

*Step 2:* $\frac{x\cdot 9x^2\sqrt{2x}}{3}$

*Step 3:* $\frac{9x^3\sqrt{2x}}{3}$

*Step 4:* $3x^3\sqrt{2x}$

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

13. Simplify completely: $\frac{5\sqrt{32}}{2\sqrt{3}}$

(A) $\frac{10\sqrt{6}}{3}$

(B) $\frac{40\sqrt{6}}{3}$

(C) $\frac{5\sqrt{96}}{6}$

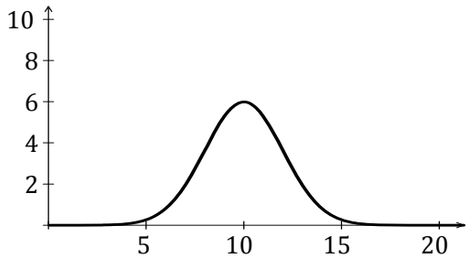
(D) $\frac{10\sqrt{96}}{12}$

14. What are the restrictions on the variable for $\sqrt{x+2}$ ?

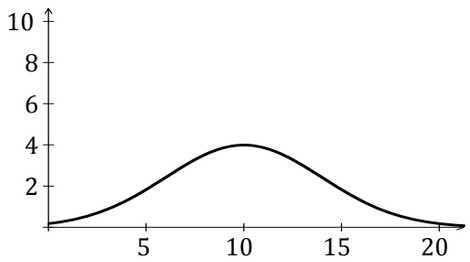
(A) $x \geq -2$
(B) $x > -2$
(C) $x \geq 2$
(D) $x > 2$

15. Which represents data with the largest standard deviation?

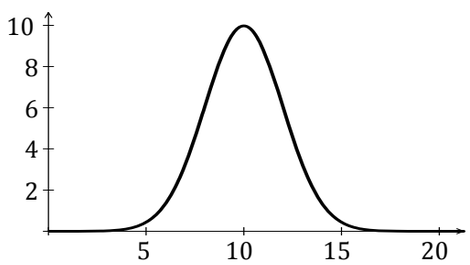
(A)



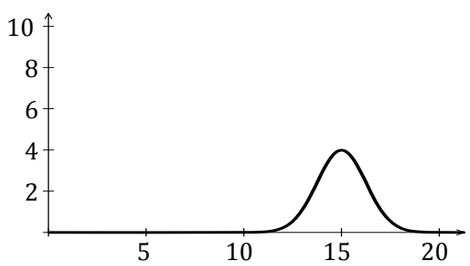

(B)



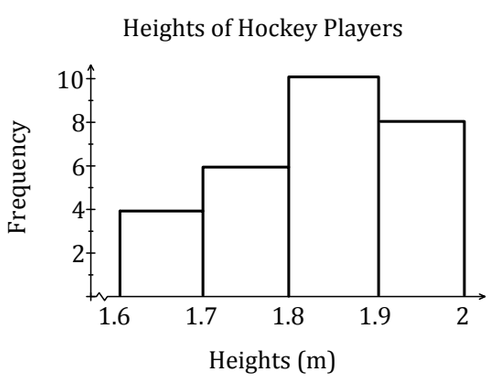

(C)




(D)




16. The histogram shown represents the heights of hockey players on a professional hockey team. How many players have a height between 1.8 m and 2.0 m?




(A) 10
(B) 18
(C) 24
(D) 28

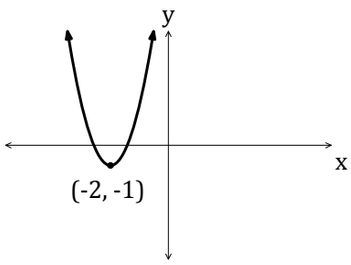
17. A set of data is normally distributed. What percent of the data is within two standard deviations of the mean?

(A) 47.5
(B) 68
(C) 95
(D) 99.7

18. The function $y = -8x^2 - 12x - 18$ has axis of symmetry $x = -2$. Which represents

the function?

(A)

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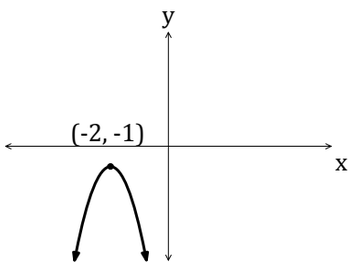
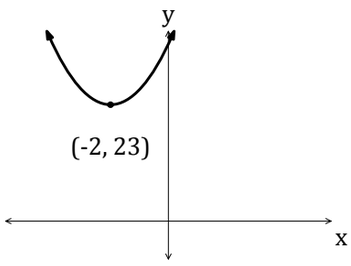
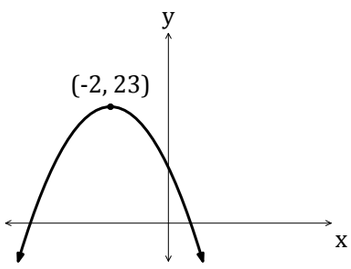



(C)




(D)




19. What is the domain and range for $f(x) = -2(x+1)^2 - 3$ ?

(A) $x \in \mathbb{R}$ and $f(x) \leq -3$

(B) $x \in \mathbb{R}$ and $f(x) \geq -3$

(C) $x \leq -1$ and $f(x) \in \mathbb{R}$

(D) $x \geq -1$ and $f(x) \in \mathbb{R}$

20. A parabola has x-intercepts of $(-2,0)$ and $(-8,0)$. What is the axis of symmetry?

(A) $x = -5$
(B) $x = -3$
(C) $y = -5$
(D) $y = -3$

21. What is the vertex of $y = 2x^2 + 8x - 5$ ?

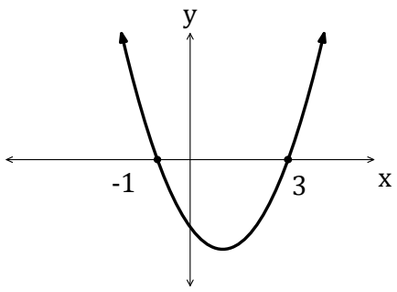
(A) $(-2,-29)$
(B) $(-2,-13)$
(C) $(2,15)$
(D) $(2,19)$

22. The graph of a quadratic function has vertex $(1,-4)$ and opens upward. How many x-intercepts does it have?

(A) 0
(B) 1
(C) 2

(D) 3

23. What is the equation of the function graphed below?



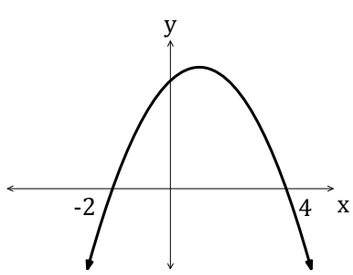

(A) $y = (x - 1)(x - 3)$
(B) $y = (x - 1)(x + 3)$
(C) $y = (x + 1)(x - 3)$
(D) $y = (x + 1)(x + 3)$

24. Which is a root of $2x^2 - 5x - 3 = 0$

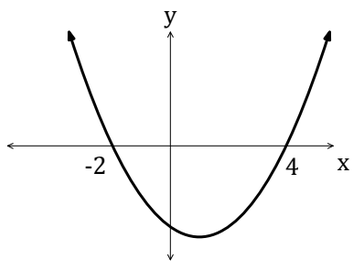
(A) $-3$
(B) $-1$
(C) $1$
(D) $3$

25. Which represents a quadratic function with zeros of $-2$ and $4$ and a maximum value?

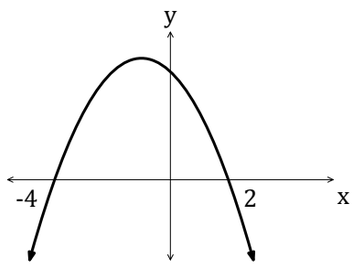
(A)



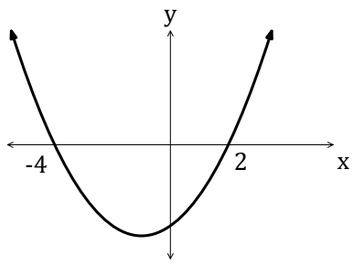

(B)



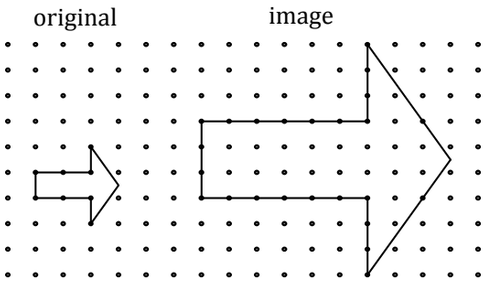

(C)




(D)




26. What is the scale factor in the figure below?



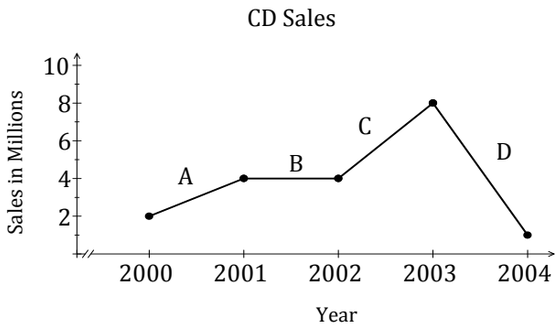

(A) $\frac{1}{3}$

(B) $\frac{1}{2}$

(C) 2

(D) 3

27. During which time period was the growth rate of CD sales the greatest in the graph shown?




(A) 2000 – 2001
(B) 2001 – 2002
(C) 2002 – 2003
(D) 2003 – 2004

28. The surface area of a cone is $34\ ft^2$. If the cone is enlarged by a scale factor of 3, what is the surface area, in $ft^2$, of the image?

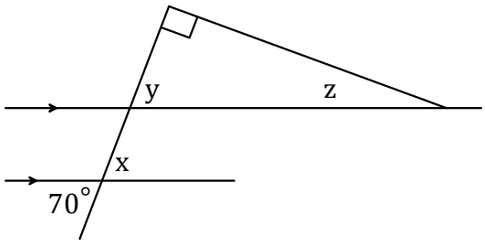
(A) 37
(B) 102
(C) 306
(D) 918

**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 result for the given number trick will always be the original number. [4 marks]

| *NUMBER TRICK* | Inductive Reasoning | Deductive Reasoning |
|---|---|---|
| *Choose a number.* | _____ | _____ |
| *Double it.* | _____ | _____ |
| *Add 6.* | _____ | _____ |
| *Double it* | _____ | _____. |
| *Subtract 4.* | _____ | _____ |
| *Divide by 4.* | _____ | _____ |
| *Subtract 2.* | _____ | _____ |

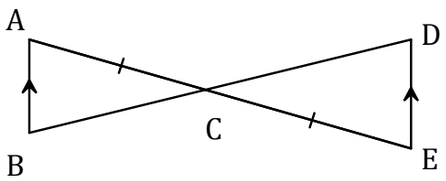
30. Find the measure of each indicated angle. Justify your answer. [3 marks]



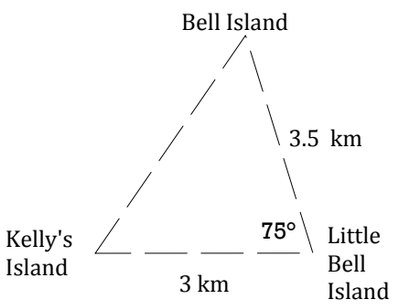

31. Use either a paragraph or two-column format to complete the given proof: [3marks]

Given: AB ∥ DE
AC = EC

Prove: $\Delta ABC \cong \Delta EDC$




32. A boat travels from Bell Island to Kelly's Island to Little Bell Island, and returns directly back to Bell Island. What is the total distance travelled? [4 marks]




33. Simplify completely: $5\sqrt{6}\left(\sqrt{3}+3\sqrt{12}-\sqrt{2}\right)$ [3 marks]

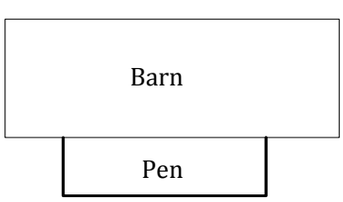
34. State the **restrictions** on *x*, **solve** the equation, and then **check** for extraneous roots. [4 marks]

$\sqrt{3x+1}-3=-4$

35. A factory produces automotive brake pads with a mean mass of 174 g and a standard deviation of 0.7 g. Quality control expects that the mass of the pads will lie within the acceptable range of 173.9 g and 174.1 g. What is the confidence interval and margin of error this factory uses for its quality control tests? [2 marks]

36. Jason scored 82% on a test where the class average was 74% and the standard deviation was 10.6%. If the class was normally distributed, what percentage of the class scored better than Jason? [3 marks]

37. A farmer has $300\ m$ of chain link fencing to create a rectangular pen, using the side of a barn as one side of the pen. Algebraically determine the maximum area that can be enclosed by the pen. [4 marks]




38. Algebraically determine the **vertex** and **x-intercepts** for the function $y=x^2-2x-8$. Sketch the graph, labelling all key points. [3 marks]

39. Solve the given equation. State the solution(s) in **exact** form. [3 marks]

$6x^2=-4x+3$

40. On another planet, the path of a rock that is thrown is given by $h=-t^2+4t+6$, where h is height in metres and t is time in seconds. At what time(s) would the height of the rock be $9\ m$ ? [3 marks]