

Grade 9 Exam Review

Unit	Review Pages	Corrections
Unit 1: Square Roots & Surface Area 9.N.5, 9.N.6, 9.SS.2	Review p. 45 - 47	p. 471-473
Unit 2: Powers & Exponent Laws 9.N.1, 9.N.2, 9.N.4	Review p. 87 - 89	p. 478-479
Unit 3: Rational Numbers 9.N.3, 9.N.4	Review p. 144 - 145 Cumulative Review Units 1-3 p.148 -149	p. 485-486 p. 486-487
Unit 4: Linear Relations 9.PR.1, 9.PR.2	Review p. 201 - 203	p. 498-501
Unit 5: Polynomials 9.PR.5, 9.PR.6, 9.PR.7	Review p. 259 - 261	p. 511
Unit 6: Linear Equations & Inequalities 9.PR.3, 9.PR.4	Review p. 308 - 309 Cumulative Review Units 1-6 p.312 - 313	p. 519-520 p. 521
Unit 7: Similar Triangles and Line and Rotations Symmetry 9.SS.3, 9.SS.5	Review p. 377 - 378	p. 531-532
Unit 8: Probability & Statistics 9.SP.1, 9.SP.2, 9.SP.3, 9.SP.4	Review p. 458-59	p. 538-539
Final Review	Cumulative Review Units 1-9 p. 464 - 467 #1-24	p. 540

The textbook's "Study Guide" for each chapter is a great resource for exam review. The Study Guide is on the page right before each review.

GRADE 9 MATH REVIEW

Unit 9: Statistics

- The population is the group from which you are gathering information.
- When a census is conducted, data is collected from the entire population.
- When data is collected from only part of a population, a sample is used. The sample must be representative of the population
- Sample types include: random, systemic, cluster, self-selected
- Problems may arise if a person does not consider: bias, use of language, ethics, cost and time, timing, privacy, cultural sensitivity
- Be able to determine the population of a study, if a census or a sample should be used and explain why, predict the number of a specific outcome given a statistic based upon a similar study, and explain potential problems of a study
- Be able to distinguish between subjective judgement, theoretical and experimental probability.

Questions

1. In each case, identify potential problems.
 - a) For a class project, a student needed to determine if college students were maintaining healthy weights. After the student completed the project, she gave a weight loss company the addresses of any overweight participants.
 - b) To determine people's reactions to a possible increase in minimum wage, a student asked, "Don't you agree that minimum wage should increase?"
2. For a school project, Raheem wants to find out if there is an increase in teen pregnancy in Canada. Describe the effect of problems Raheem might encounter related to: a) privacy b) cultural sensitivity c) use of language.
3. Describe the population - The management team of a shopping mall in Comox, BC wants to know how to attract more people between the ages of 13 and 25 to the mall.
4. Should a census or sample be used to collect data? Explain your choice -the effectiveness of a new suntan lotion

Answers

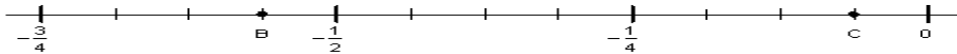
1. a) ethics: the student used the info obtained for something other than what she claimed b) use of lang: the question is biased toward increasing the wage 2. a) privacy: pregnant teens may not to admit they are pregnant b) culture: many cultures have different beliefs about teenage pregnancy c) use of lang: he may word the question in a way that condemns or supports teenage pregnancy 3. Residents of Comox, BC ages 13 to 25 4. Sample - you cannot test every lotion made otherwise there would not be any lotions to sell

Unit 3: Rational Numbers

- A rational number is any number that can be written in the form $\frac{m}{n}$, where m and n are integers and $n \neq 0$.
- Be able to order numbers from smallest to largest and vice versa and place numbers on a number line.
- Be able to perform all operations with rational numbers, remembering BEDMAS.

Questions

1. Write the rational number represented by each letter on the number line as a decimal and a fraction.



2. Order the following from least to greatest.

$$3.12, -\frac{4}{3}, 0.9, -\frac{1}{2}, -0.4$$

3. Write 3 rational numbers between the pair of numbers.
-5.6 and -5.7
4. A technician checked the temperature of a freezer and found that it was -15.7°C . She noted that the temperature had dropped 7.8°C from the day before. What was the temperature the day before?
5. The temperature in Richmond, BC, at 4:00 pm was 2°C . The temperature drops 1.3°C each hour. What will the temperature be at 11:00 pm?
6. Evaluate. Show your work to illustrate order of operations in g and h.
 - a) $-1.2 + (-0.3)$
 - b) $-4\frac{5}{6} + (-1\frac{5}{12})$
 - c) $-71.91 - 11.23$
 - d) $\left(-\frac{4}{7}\right)\left(-\frac{2}{3}\right)$
 - e) $-20.6 \div -0.9$
 - f) $\left(-1\frac{2}{3}\right) \div \left(3\frac{1}{2}\right)$
 - g) $\left(-\frac{2}{3}\right)\left(-\frac{2}{3}\right) \div \frac{2}{9} - \left(-\frac{4}{5}\right)$

$$h) (-0.2 + 0.9)^2 + 9.8 \div (-0.7)$$

7. Consider the following numbers: $5\pi, 5, \sqrt{5}$

a) Which of these is a rational number? _____

b) Justify your answer in words.

8. Evaluate.

a) $25.4 - 6.5 \times (8.7 - 4.7)$

b) $5.6 \times 2.8 - 1.4 \times 0.4$

c) $1\frac{7}{8} - 2\frac{2}{5} - 1\frac{3}{4}$

d) $\left[\frac{1}{3} + \frac{3}{5}\right] \div \left[\left(-\frac{5}{9}\right) \times \frac{12}{25}\right]$

e) $\frac{5}{6} - \frac{2}{3} \times \frac{3}{4} + \frac{5}{6}$

f) $\left[\frac{8}{9} \times \left(-\frac{5}{12}\right)\right] \div \left(-\frac{4}{9}\right)$

g) $\left[1\frac{5}{7} \times \left(-3\frac{5}{6}\right)\right] \div \left[\left(-2\frac{1}{10}\right) \div \frac{7}{8}\right]$

Answers: 1. C=-1/16 (-0.0625), B=-9/16 (-0.5625) 2. -4/3, -1/2, -0.4, 0.9, 3,12 3. Many possible answers eg. -5.62, -5.67, -5.605 4. -7.9°C 5. -7.1°C 6. a)-1.5 b) $-6\frac{1}{4}$ c)-83.14 d) 8/21 e) 22.8(repeating)

f) -10/21 g) 2 4/5 h) -13.51 7. a) 5 b) 5π & $\sqrt{5}$ are irrational numbers 8. a) -0.6 b) 15.12 c) $-2\frac{11}{40}$

d) $-\frac{7}{2}$ e) $1\frac{1}{6}$ f) $\frac{5}{6}$ g) $2\frac{31}{42}$

Unit 2: Powers

Be able to:

- state the base, exponent and power, write a power as a repeated multiplication and vice versa
- evaluate powers, keeping in mind order of operations and predict whether the answer is positive or negative without calculating it
- evaluate a power when substituting
- use the 4 exponent laws: product law, quotient law, zero exponent law, and power of a power law

Questions

1. State the base, exponent, and power of $(-4)^3$ and 2×4 .

2. Evaluate: -4^5 and $(-5)^4$

3. Write $(-4) \times (-4) \times (-4) \times (-4) \times (-4) \times (-4) \times (-4)$ as a power and predict whether it will have a positive or negative answer.

4. Evaluate: a) $(3 + 4)^2 (4 - 6)^3$ b) $(11^3 + 5^2)^0 + (4^2 - 2^4)$

c) $\frac{81^2}{9^2 + (-9)^2}$

5. Identify and correct the error.

$$\begin{aligned} & 3^2 + 2^2 \times 2^4 + (-6)^2 \\ & = 9 + 4 \times 16 - 36 \\ & = 13 \times 16 - 36 \\ & = 172 \end{aligned}$$

6. Which power is larger: -5^2 or $(-5)^2$?

7. Simplify $\left(\frac{2}{5}\right)^2, (-2)^4, \frac{2^3}{3}$

8. If $x = -5$ and $y = -3$, determine the value of $-2x^2y^3$.

9. Exponent Laws a) $(x^4)(x^2)$

b) $(-2x^3)^2$

c) $\frac{m^3n^7}{mn^2}$

d) $4^0 a^2 b$

e) $(-2t)^2 t^3$

f) $2x^0 x^4$

g) $\frac{12x^3y^6}{-4x^2y^5}$

10. Find and correct any errors.

a) $(-3)^6 \div (-3)^2 = (-3)^3 = 27$

b) $(-4)^2 + (-4)^2 = (-4)^4 = -256$

c) $\frac{(-5)^2(-5)^4}{(-5)^3(-5)^0} = \frac{(-5)^6}{(-5)^3} = 5^2 = 25$

11. Simplify each expression. a) $(4^0)^6$ b) $\left[(-2)^3\right]^3$

12. What value must replace the "x" to make the equation true? Justify your answer.

$$\frac{2^8}{2^x} = 32$$

13. a) If $x = 5$ and $n = 2$, what is the value of $-3x^n$? b) Determine the value of $-3x^n$ when "x" changes to $\frac{1}{5}$. Show your work.

14. A student answered the following question below:

$$\begin{aligned} & (5+3)^2 \times 4+5 \\ & = 8^2 \times 9 \\ & = 64 \times 9 \\ & = 576 \end{aligned}$$

a) Explain the errors in this student's work. b) Show the correct process and final answer.

15. Insert brackets to make each statement true. Prove that the brackets are in the correct location in each question.

a) $3^2+4 \times 5 - 2^2 = 13$

b) $3^2 + 4 \times 5 - 2^2 = 61$

16. Simply, **then** evaluate. $\left[(-2)^4 \times (-2)^3\right] - \left[(-3)^4 \div (-3)^3\right]$

Answers: 1. b: -4, x exp: 3, 4 pow: $(-4)^3, x^4$ 2. -1024, 625 3. $(-4)^7$, negative 4. a) -392 b) 1 c) 40.5 5. 109, errors: +36, not -36 and multiply before adding 6. $(-5)^2$ 8. 4/25, 16, 7/3 8. 1350 9. X^6 b) $4x^6$ c) m^2n^5 d) a^2b e) $4t^5$ f) $-3xy$ 10. A) subtract exponents when dividing powers $(-3)^4=81$ b) No law for adding powers $16+16=32$ c) Subtract exponents when dividing powers $(-5)^3=-125$ 11. a) 1 b) -512 12. a) $x = 3$
 13. a) -75 b) $-\frac{3}{25}$ 14. a) 1st line: must multiply 4 before adding $4 + 5$ b) 261 15.
 $(3^2 + 4) \times (5 - 2^2) = 13$ b) $(3^2 + 4) \times 5 - 2^2 = 61$ 16. -125

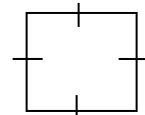
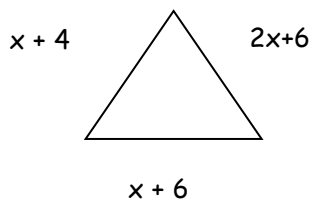
Unit 5: Polynomials

Be able to:

- Name parts of an expression and types of polynomials
- Translate mathematical expressions into written words and vice versa
- Recognize and collect like terms
- Add and subtract polynomials
- Multiply and divide polynomials by a monomial

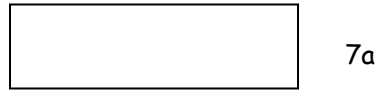
Questions:

1. Name the variable(s), coefficient(s), constant in the following expression $-3x^2 + 4y - 5$
2. Express $2x+1$ and $2(x^3-5)$ in written statements. Express 3 less than twice a number in an algebraic expression.
3. Simplify. (collect like terms)
 - a) $4x^2 - 3x + 2x^2 - 4x + 6$
 - b) $2(x^3 + 4x) - 3(2x^3 - 3x)$
 - c) $(5r^2 - 3r + 7) - (2r^2 + 5r - 8)$
 - d) The perimeter of the triangle is equal to the perimeter of the square. Find the length of the square in terms of x.



- e) State 2 algebraic examples of 2 binomials whose difference is $2x-3$.
- f) Find the value of k and t if $3x + 2y - x + 4y = kx + ty$.
4. Multiply and divide.
 - a) $2m(3n)(-4n)$
 - b) $-(5r)(-6s)(2t)$

c) Find the area. 2a



d) $-2(4x^2 - 4x + 7)$

e) $3x(4x^2 + 5x - 9)$

f) $(5y - 7)y$

g) Divide: $\frac{15h^4 - 30h^3}{5h^2}$

h) $2x(x - 3y) - 3x(5x - y)$

i) The perimeter of a rectangle is $10x - 4$. The length of the rectangle is $2x + 2$. Determine the width.

j) Divide: $\frac{-27w^5 + 18w^3 - 9w^2}{-9w^2}$

5. Equivalent expressions

Write 4 different equivalent expressions for $2x + 6$.

6. Evaluating Expressions

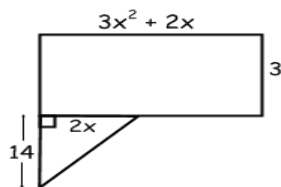
a) If $x = -3$, find the value of $2x - 1$.

b) Determine which expression gives the least value when $x = -3$.

$$2x, x + 2, \frac{x}{2}, x - 2, 2 + x, 2 - x$$

c) Evaluate $4(x^2 - y) - 3(x - y^2)$ when $x = 1$ and $y = -2$.

7. a) Write an algebraic expression for the area of the rectangle.



b) Write the algebraic expression for the triangle.

c) Write the simplified expression for the total area of the figure.

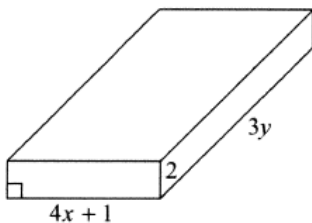
8. a) Determine the expression for the width of the rectangle.

$$L = 12xy$$

$$A = 36x^2y^2$$

b) What is the perimeter of the rectangle?

9. a) Write the simplified algebraic expression for the volume of this rectangular prism.



- b) If $x = 2$, substitute this value into your expression in a) and simplify it.
 c) The volume of this prism is 270 cm^3 . Knowing that $x = 2$, what is the value of "y"?

10. If the sum of two polynomials is $4x^2 - 3x - 17$ and one of the polynomials is $-3x^2 - 3x + 25$, what is the other polynomial?

Answers: 1. Var: x, y coefficients: $-3, 4$ constant -5 2. Two times a number add one; double the difference of a number cubed and 5; $2x-3$ 3. a) $6x^2 - 7x + 6$ b) $4x^3 + 17x$ c) $3r^2 - 8r + 15$ d) $x + 4$ e) many answers eg. $(4x - 5) - (2x - 2)$ or $(-6x + 7) - (-8x + 10)$ f) $k = 2, t = 6$ 4a) $-24mn^2$ b) $6Orst$ c) $14a^2$ d) $-8x^2 + 8x - 14$ e) $12x^3 + 15x^2 - 27x$ f) $5y^2 - 7y$ g) $3h^2 - 6h$ h) $-13x^2 - 3xy$ i) $3x - 4$ j) $3w^3 - 2w + 1$ 5. Many answers $2(x + 3)$; $x + x + 3 + 3$ 6. a) -7 b) $2x$ is the least c) 21 7a) $9x^2 + 6x$ b) $14x^2$ c) $23x^2 + 6x$ 8. a) $w = 3xy$ b) $30xy$ 9. a) $24xy + 6y$ b) $54y$ c) $y = 5$ 10. $7x^2 - 42$

Unit 5: Equations and Inequalities

- Be able to solve one step to four step equations with rational numbers
- Be able to write equations based upon word problems
- Be able to write and graph inequalities and determine if a number is solution of an inequality
- Solve multi-step inequalities (including word problems)

Questions

1. Determine the solution.

- a) $-2.7 = \frac{a}{4}$
 b) $6(n - 8.2) = -18.6$
 c) $22 - 7d = -8 - 2d$
 d) $2(t - 8) = 4(2t - 19)$

e) $\frac{3}{2}x + \frac{4}{3} = \frac{5}{8}x + \frac{5}{2}$

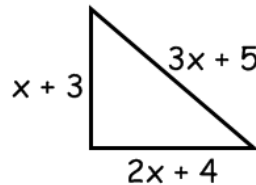
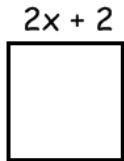
Solve and graph

f) $-3x > 6$

g) $\frac{-n}{8} + 2 \leq -7$

h) $-5(4 - 0.8s) \geq 3(19 - s)$

- If $x = -2$ and $ax + 3 = 5$, find the value of a .
- Tina is three times as old as Kim. Glen is 4 years younger than Tina. The sum of their ages is 59. How old is each person?
- Daphne will sell her video game system for \$140 to Surinder. She also offers to sell him video games for \$15 each. Surinder has saved \$210 in total. How many video games can Surinder buy from Daphne? Write and solve the inequality.
- The perimeters of the square and the triangle are the same. Solve for "x".



6. Given the equation: $3(x + 2) = x + 2(x + 3)$

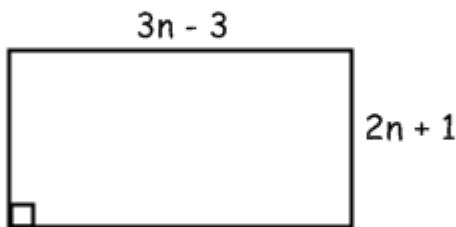
- Check that $x = 5$ and $x = -1$ are **both** solutions of this equation.
- Choose any other value for "x" and check that it is also a solution to the equation.
- Solve the equation algebraically. Explain why every number is a solution to the equation.

7. John graphed the solution to the inequality: $4x - 7 \leq 2x - 1$.

- Explain the two errors that John made.
- Draw the correct solution.

8. In the following rectangle, the perimeter is less than 96 cm.

- For what whole number value of "n" is the perimeter the greatest?
- Explain whether or not "n" can have a value of 1 in the rectangle.



Answers: 1a) $a = -10.8$ b) $n = 5.1$ c) $d = 6$ d) $t = 10$ e) $x = 4/3$ f) $x < -2$ g) $n \geq 72$ h) $s \geq 11$ 2. $a = -1$

3. Kim = 9 Tina = 27 4. $140 + 15n \leq 210, n \leq 4 \frac{2}{3}$ 5. $x = 2$ 6. A) LHS = RHS in both equations

b) $36=36$ c) $3x+6 = 3x+6$ 7. a) $x \leq 3, \text{not } -3$ 8. a) 9 b) No the length cannot = 1

Unit 6: Linear Relations

Be able to:

- Describe and write equations from patterns
- Use an equation or pattern to make a table of values and graph the resulting line on a Cartesian plane; decide if a line should be drawn to connect the points
- Graph and describe horizontal and vertical lines
- Match an equation to a graph and vice versa
- Use graphs to estimate values by interpolating and extrapolating

Questions

1.



Figure 1



Figure 2

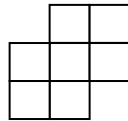


Figure 3

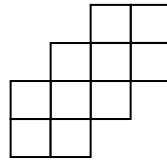
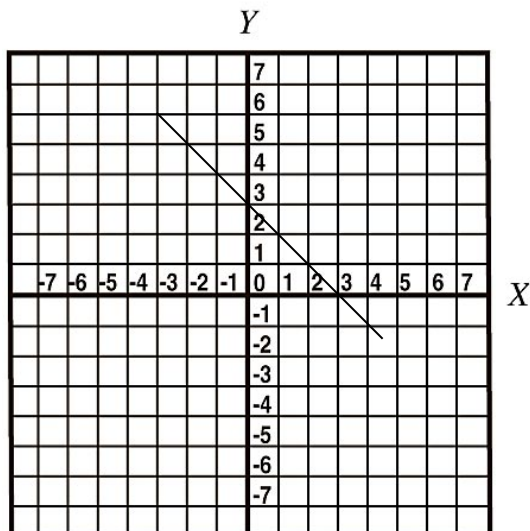


Figure 4

- Describe the pattern relating the figure number and the number of squares.
 - Create a table of values from figure number 1 to 5.
 - Write a linear equation that describes the pattern.
 - How many squares does figure 12 have? What figure number has 106 squares?
 - Graph the linear relation. Can you connect the points?
2. Which equation describes the graph?
- $x + y = 3$
 - $x - y = 3$
 - $y - x = 3$
 - $x + y = -3$



3. Graph each line.

a) $Y=5$

b) $2x - 2 = 10$

c) $2x + y = 6$

d)

$3x - 2y = -6$

4. A parking lot charges a flat rate of \$3.00 and \$1.75 for each hour or part of an hour of parking.

a) Create a table of values for the first 8 h of parking.

b) Graph the linear relation.

c) Use the graph to approximate how much it would cost to park for 4h.

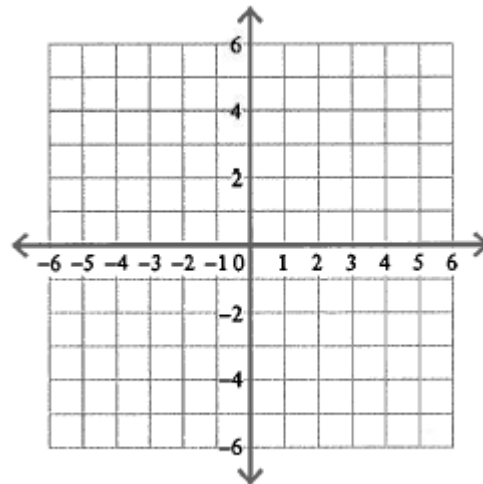
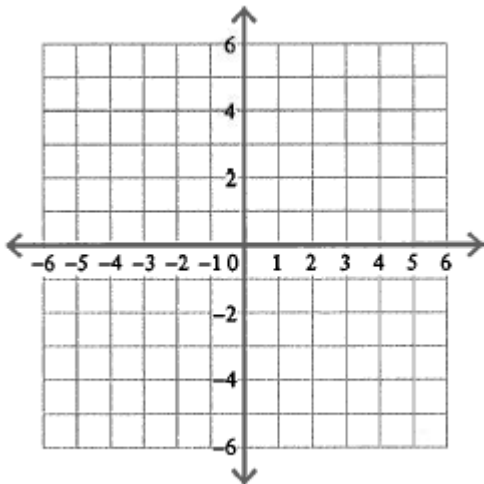
d) Using the graph, approximately how long could you park if you had \$15.25?

e) What equation describes this relation?

5. Graph the following equations on the graphs provided.

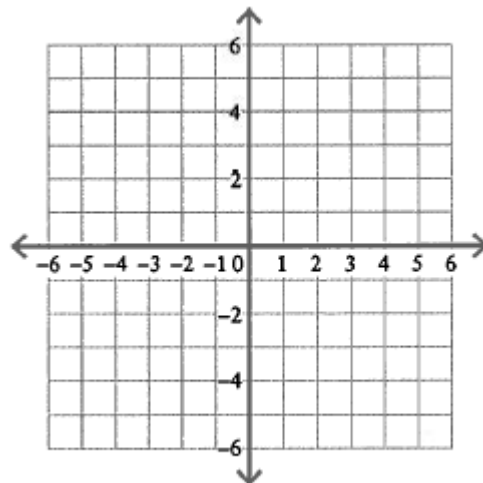
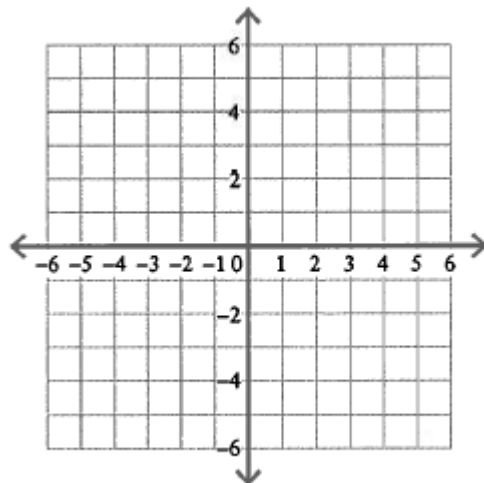
a) $y = 3x - 1$

b) $y = \frac{1}{4}x + 3$

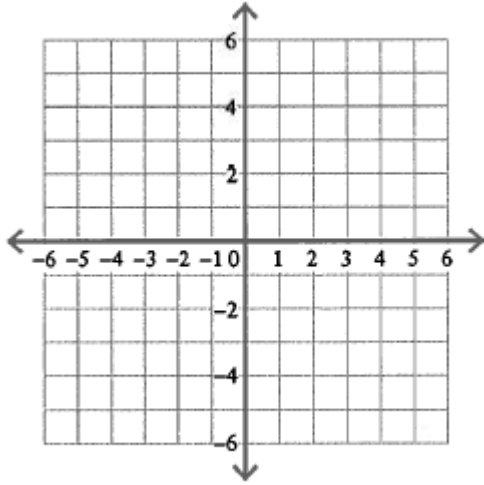


c) $y = -3$

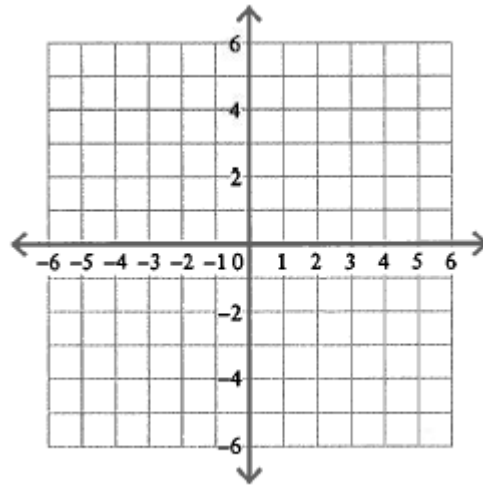
d) $x = 5$



e) $3x + y = 1$



f) $x - 2y = 4$



Answers: 1a) As the figure # increases by 1, the # of squares increases by 3 starting at 1. b) figure number (n) 1,2,3,4,5 number of squares (s) 1,4,7,10,13 c) $s = 3n - 2$ d) 34 squares and figure # 36 e) graph with the points (1,1), (2,4), (3,7), (4,10), (5,13); don't connect the points b/c can't do a part of a figure 2. $x + y = 3$ 4.

Number of hours, t	Cost, C (\$)
0	3.00
1	4.75
2	6.50
3	8.25
4	10.00
5	11.75
6	13.50
7	15.25
8	17.00

b) Graph c) \$10.00 d) 7 h e) $C = 1.75t + 3$

Unit 1: Square Roots and Surface Area

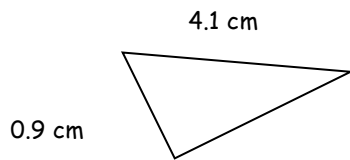
Be able to:

- Determine the square roots of perfect squares. Estimate the square roots of non-perfect squares.
- State which decimals and fractions are perfect squares.
- Determine the surface area of composite objects that include right prisms, triangular prisms, and cylinders.

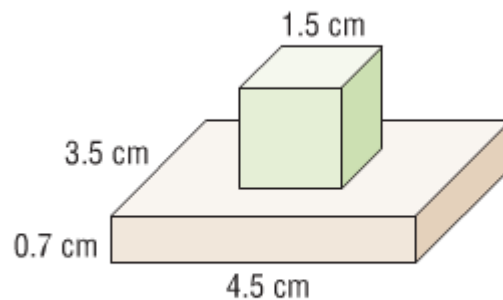
Questions:

1. Determine the value of each square root. a) $\sqrt{0.04}$ b) $\sqrt{\frac{4}{81}}$ c) $\sqrt{90.25}$

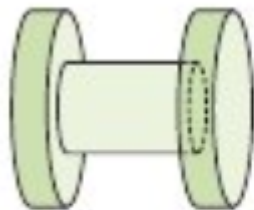
2. Which numbers are perfect squares? a) $\frac{9}{64}$ b) 5.76
3. Use benchmarks to estimate each square root. a) $\sqrt{42.8}$ b) $\sqrt{\frac{9}{100}}$
4. Determine the value of $\sqrt{\frac{\sqrt{81} + \sqrt{49}}{\sqrt{196} - \sqrt{100}}}$.
5. Which number is greater $\sqrt{25} + \sqrt{144}$ or $\sqrt{25 + 144}$. Show your reasoning.
6. Determine the unknown length.



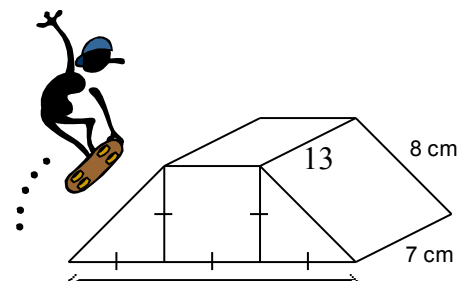
7. Determine the surface area of the figures
- a)



- b) Each of 2 congruent cylinders is 2.8 cm long, with radius 7.8 cm. The middle cylinder is 10.4 cm long, with radius 3.6 cm.



- c) This skateboard ramp is composed of two right triangular prisms and a right rectangular prism. Determine the surface area of the ramp. (Exclude the bottom surface.)



Answers: 1.a) 0.2 b) 2/9 c) 9.5 2.a) yes, 9 and 64 are perfect squares b) $5.76=576/100$ yes, both 576 and 100 are perfect squares 3.a) about 4. 2 5. $\sqrt{25} + \sqrt{144}$ 6. 5 b) 0.3 6. 4 cm 7. 51.7 m^2 b) 1192.8 cm^2 c) 298 cm^2

Unit 5: Similar Triangles and Symmetry

Be able to:

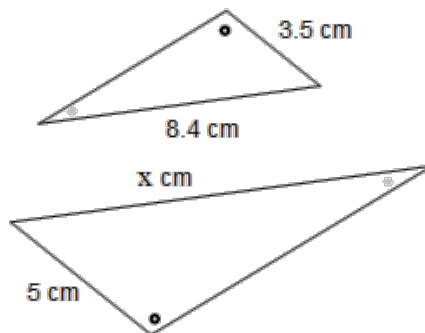
- Determine corresponding angles and sides of a triangle and if a triangles are similar.
- Calculate the value of a variable in a proportion.
- Determine the side lengths and angle measurements of similar triangles.
- Determine the lines of symmetry of a shape
- Determine the order of the rotation of symmetry of a shape.

1. Determine the value of the variable in the proportion.

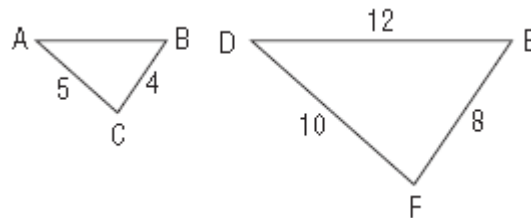
a) $\frac{4}{5} = \frac{20}{x}$

b) $\frac{12.5}{50} = \frac{y}{6.0}$

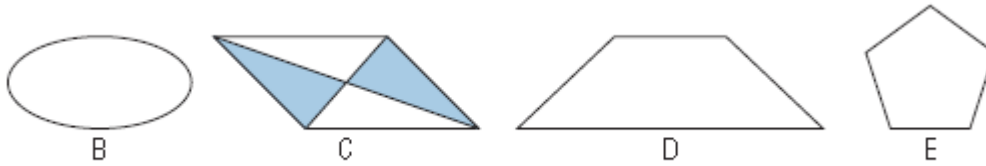
2. Determine if the triangles are similar. If so, determine the corresponding angles and sides.



3. Determine the length of AB in the pair of triangles.

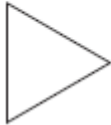


4. Draw the lines of symmetry for each shape below.

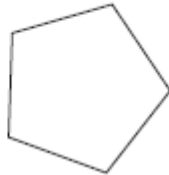


5. Determine the order of rotational symmetry for each regular polygon.

a) an equilateral triangle



b) a regular pentagon



c) a square

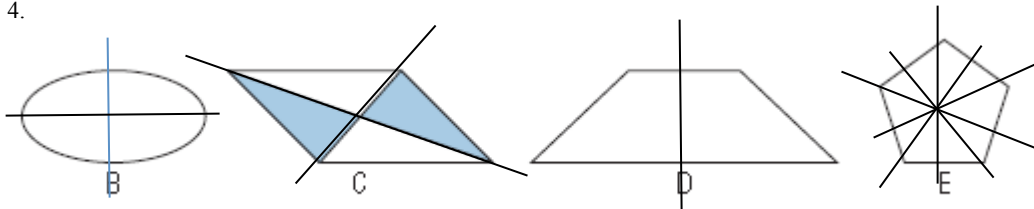


d) a regular octagon



Answers: 1a) $x = 25$ b) $x = 1.5$ 2. $\triangle SUT \sim \triangle JGH$ so SU corresponds to JG; UT corresponds to GH; TU corresponds to HJ and $\square S$ corresponds to $\square J$; $\square U$ corresponds to $\square G$; $\square T$ corresponds to $\square H$; 2. $x = 12$ cm 3.

4.



5. a) 3 b) 5 c) 4 d) 8

Vocabulary

There will be a vocabulary portion of the exam. Ensure that you know the definitions and names of the following:

- a) Power Unit: power, exponent, base, repeated multiplication
- b) Polynomial Unit: expression, equation, polynomial, trinomial, binomial, monomial, coefficient, constant, variable, term, degree
- c) Probability: theoretical probability, experimental probability, subjective judgement, bias, sample, census, population, random sample
- d) Linear Relations: Interpolate and extrapolate
- e) Similarity: Corresponding angles and corresponding sides

