

ALGEBRA

SUMMER

PACKET

Algebra Summer Packet

June, 2010

Dear 7th grade student,

You have been recommended to take algebra in 8th grade. As part of the course, you are required to complete the problems in this packet during summer vacation. We have included problems that review the math skills you will need for algebra. The packet can also be found on the Brockton Public Schools website: bpsma.org.

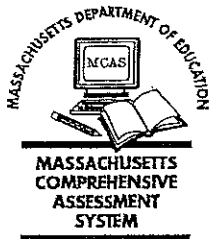
You need to show all your work: write the formulas, substitute the values, label answers, etc. Work can be done on the actual worksheet or on a separate piece of paper. If you do your work on a separate piece of paper, label which page you are working on. We have provided an MCAS Reference Sheet for you to use.

In September, your math teacher will collect your work during the first week of school, and you will be tested on the problems in the packet. These will be your first grades for algebra.

Remember, this work is required.

Please sign the class list indicating that you have received the work.

Enjoy your summer vacation. There will still be lots of time for you to have additional fun.



Massachusetts Comprehensive Assessment System Grade 8 Mathematics Reference Sheet

PERIMETER FORMULAS

square..... $P = 4s$

rectangle..... $P = 2b + 2h$

OR

$P = 2l + 2w$

triangle..... $P = a + b + c$

AREA FORMULAS

square..... $A = s^2$

rectangle..... $A = bh$

OR

$A = lw$

parallelogram..... $A = bh$

triangle..... $A = \frac{1}{2}bh$

trapezoid..... $A = \frac{1}{2}h(b_1 + b_2)$

circle..... $A = \pi r^2$

TOTAL SURFACE AREA FORMULAS

rectangular prism... $SA = 2(lw) + 2(hw) + 2(lh)$

cylinder..... $SA = 2\pi r^2 + 2\pi rh$

sphere..... $SA = 4\pi r^2$

VOLUME FORMULAS

rectangular prism..... $V = lwh$

OR

$V = Bh$

($B =$ area of a base)

cube..... $V = s^3$
($s =$ length of an edge)

cylinder..... $V = \pi r^2 h$

sphere..... $V = \frac{4}{3}\pi r^3$

CIRCLE FORMULAS

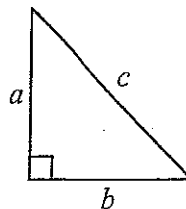
$C = 2\pi r$

OR

$C = \pi d$

$A = \pi r^2$

PYTHAGOREAN THEOREM



$$a^2 + b^2 = c^2$$

PROPORTIONS

Solve each proportion. Show your work.

1. $\frac{16 \text{ miles}}{90 \text{ minutes}} = \frac{x \text{ miles}}{270 \text{ minutes}}$

2. $\frac{16 \text{ sandwiches}}{3 \text{ bags}} = \frac{x \text{ sandwiches}}{12 \text{ bags}}$

3. $\frac{72 \text{ dollars}}{12 \text{ hours}} = \frac{x \text{ dollars}}{6 \text{ hours}}$

4. $\frac{112 \text{ ounces}}{x \text{ cans}} = \frac{24 \text{ ounces}}{3 \text{ cans}}$

5. $\frac{9 \text{ tons}}{3 \text{ days}} = \frac{12 \text{ tons}}{x \text{ days}}$

6. $\frac{3 \text{ goals}}{2 \text{ games}} = \frac{9 \text{ goals}}{x \text{ games}}$

7. $\frac{x \text{ dollars}}{21 \text{ pounds}} = \frac{6 \text{ dollars}}{12 \text{ pounds}}$

8. $\frac{48 \text{ books}}{x \text{ shelves}} = \frac{36 \text{ books}}{3 \text{ shelves}}$

PROPORTIONS-2

Write and solve a proportion to answer each problem. Show your work.

1. Tommy types 54 words per minute, with an average of 3 mistakes. How many mistakes would you expect Tommy to make if he typed 300 words?
2. Jackie burns 250 calories per hour doing aerobics. She has to burn 3500 calories to lose one pound. How long will Jackie have to work out to lose 5 pounds?
3. Six cans of fruit juice cost \$2.50. Ned needs to buy 72 cans for a camping trip for the Outdoor Club. How much will he spend?
4. A safe following distance is two car lengths for every ten miles per hour that you are traveling. If you are traveling at 65 miles per hour, how many car lengths is a safe following distance?

PERCENTS

The items below were purchased in a city with a sales tax rate of 5%. Find the amount of sales tax on each purchase.

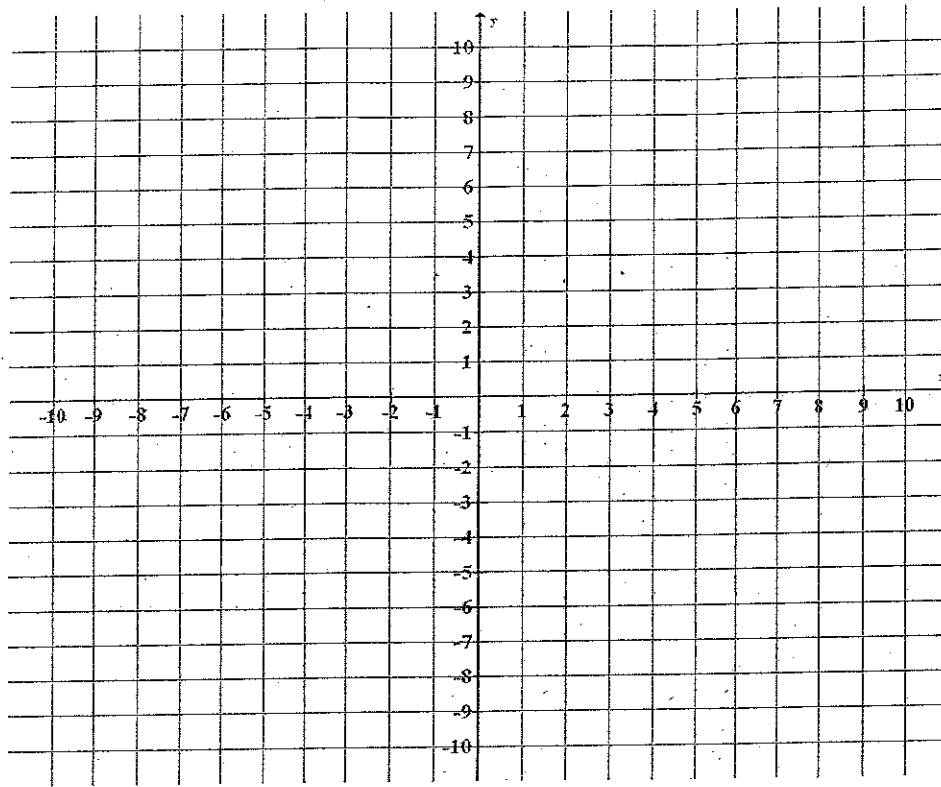
1. A DVD for \$18.00
2. A computer hard drive for \$140.00
3. A bathing suit for \$65.00
4. A bicycle for \$150.00

A shoe store is having a 25% off sale on all of its shoes. Calculate the discount on each of the pairs of shoes that sell for the original price listed below.

5. Men's running shoes for \$85.00
6. Women's cross training shoes for \$50.00
7. Softball cleats for \$29.95
8. Golf shoes for \$120

WHERE'S THE POINT ?

Plotting Points in the Coordinate Plane.



Plot and label each point in the coordinate plane.

1. A (5, 3)
2. B (0, 4)
3. C (10, 0)
4. D (-10, 0)
5. E (3, -7)
6. F (-2, -2)
7. G (-1, 9)
8. H (6, -4)
9. J (-1, -6)
10. K (-5, 8)

11. In which quadrant is point D ?

12. In which quadrant is the point (-18, -67) ?

A Driving Vacation

Sandy is driving east from San Francisco along Route 80. The graph below represents the relationship between the time that Sandy has driven and the distance that she has driven.



1. Identify the independent and dependent variables and then label the axes.
2. Write a title for the graph.
3. How far will Sandy be from San Francisco in 5 hours?
4. How far will Sandy be from San Francisco in 10 hours?
5. How far will Sandy be from San Francisco in 1 hour?
6. How fast is Sandy driving?
7. See if you can write an equation to find the number of hours that Sandy drove if she drove for 340 miles.

BIKING ALONG

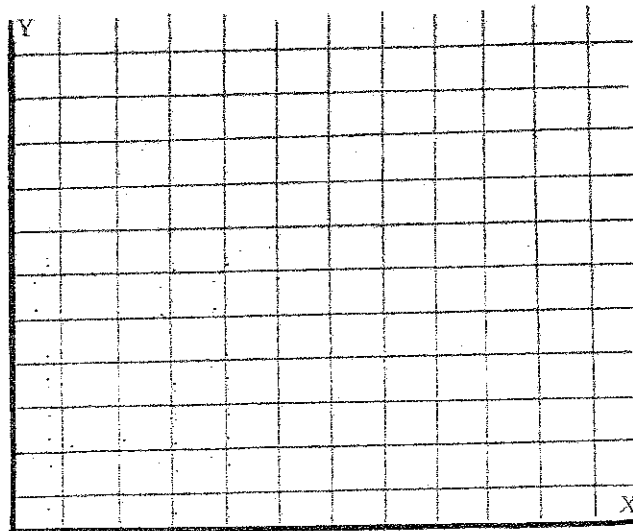
Rates of Change

You start to save money for your next bike trip that you think will cost around \$550. Your Uncle Lance gives you \$100 to start your account. You plan to save \$15 of your weekly allowance for the trip.

1. Complete the table.

Time (weeks)	Money Saved (dollars)
1	
2	
4	
6	
	325
	550

2. Write an expression which shows the relationship between time t and the amount of money you have saved.
3. Use the expression to determine the number of weeks that it will take to have \$325 in your account. Record the answer in the table.
4. How many weeks will it take until you reach your goal? Record the answer in the table.
5. Write each row in the table as an ordered pair. Then graph the ordered pairs. Draw a line through the points.



6. What is the rate of change? How did you determine it?

Table of Values

Plot each point in the table on a coordinate grid. Identify the rate of change for each.

1.

x	-3	-2	-1	0	1	2	3
y	15	13	11	9	7	5	3

2.

x	-2	-1	0	1	2	3
y	-14	-10	-6	-2	2	6

For each equation, create a table of values and graph the points. Identify the rate of change.

3. $y = x + 4$

x	-2	-1	0	1	2
y					

4. $y = 2x - 6$

x	y
-2	
-1	
0	
1	
2	

5. $y = 3x$

x	y
-2	
	-3
0	
1	
	6

6. $y = -\frac{1}{2}x + 4$

x	-2	-1	0	1	2
y					

WRITING, EVALUATING, AND SIMPLIFYING EXPRESSIONS

The Snack Shack has a special promotion in which you can buy a discount card for \$5.00 and purchase large drinks for a month for only \$1.50 each. Without a card, the price would be \$2.50.

Use this information to complete the table below.

Month	Number of Drinks Purchased	Cost of Discount Card	Total Cost of drinks (with card purchased)
January	15	\$5.00	
February	20		
March	10		
April			\$17.00
May			\$14.00
June	4		

- In the table, what values changed?
- In the table, what values do not change?
- Do the values in one column of the table depend on the values in another column?
- Show how you found the total cost of the drinks for each month?
- Would you save money by buying the discount card? Explain.

Complete the table below.

m	$4m + 8$
	20
6	
-2	
	8
.5	

ADDITION OF INTEGERS

Accentuate the Negative

Simplify each expression.

1. $-2 + (-3)$

2. $8 - 7 + 4$

3. $8 + (-5)$

4. $15 + (-3)$

5. $-16 + 8$

6. $7 + (-10)$

7. $-9 + (-5)$

8. $-12 + 14$

9. $8 + 7$

10. $9 + (-4)$

11. $-6 + (-8)$

12. $8 + (-14)$

13. $9 + (-17)$

14. $-15 + (-11)$

15. $-23 + 18$

16. $-19 + 16$

17. $27 + 34$

18. $-8 + (-17)$

19. $19 + (-8)$

20. $23 + (-31)$

SUBTRACTION OF INTEGERS

Accentuate the Negative

Find each difference.

1. $9 - 26$

2. $-4 - 15$

3. $21 - (-7)$

4. $27 - (-16)$

5. $-16 - (-43)$

6. $47 - 19$

7. $-156 - 98$

8. $-192 - 47$

9. $0 - (-51)$

10. $-63 - 89$

11. $-12 - (-21)$

12. $92 - (-16)$

13. $72 - 15$

14. $-86 - (-19)$

15. $17 - (-46)$

16. $-78 - (-53)$

17. $-19 - (-12)$

18. $-16 - (-21)$

19. $27 - 19$

20. $-14 - 27$

ORDER OF OPERATIONS INTEGERS

Accentuate the Negative

Find the value of each expression.

1. $(8 + 2) \times 9$

2. $5 - 1 \div 4$

3. $(6 + 3) \div 18$

4. $80 - 6 \times 7$

5. $4 \times 6 + 3$

6. $4 \times (6 + 3)$

7. $35 - 6 \times 5$

8. $8 \div 3 + 6$

9. $(-4)^2 + 10 \cdot 2$

10. $-4^2 + 10 \cdot 2$

11. $(5 \cdot 3)^2 + 8$

12. $5 \cdot 3^2 + 8$

13. $9 + (7 - 4)^2$

14. $-9 + 7 - 4^2$

15. $(-6)^2 + 3^3 - 7$

16. $-6^2 + 3^3 - 7$

17. $2^3 + (8 - 5) \cdot 4 - 5^2$

18. $(2^3 + 8) - 5 \cdot 4 - 5^2$

19. $2^3 \cdot 3 - 5 \cdot 5^2 + 8$

20. $2^3 \cdot 3 - 5(5^2 + 8)$

Skill: Operations With Rational Numbers (continued)**Investigation 1**

Say It With Symbols

13. $(-2)(8)$

14. $(-6)(-9)$

15. $(-3)^4$

16. -2^5

17. $(6)(-8)$

18. $(-14)^2$

19. $2(-4)(-6)$

20. $-30 \div (-5)$

21. $\frac{-52}{-13}$

22. $(-8)(5)(-3)$

23. -7^2

24. -3^5

25. $\frac{-68}{17}$

26. $\frac{(-4)(-13)}{-26}$

27. $\frac{225}{(-3)(-5)}$

28. $2^4 - 3^2 + 5^2$

29. $(-8)^2 - 4^3$

30. $32 \div (-7 + 5)^3$

31. $\frac{3}{4} \div \left(-\frac{3}{7}\right)$

32. $18 + 4^2 \div (-8)$

33. $26 \div [4 - (-9)]$

ADDITION AND SUBTRACTION OF RATIONAL NUMBERS

Accentuate the Negative

Find each sum or difference as a mixed number or fraction in simplest form.

1. $\frac{3}{4} + \frac{7}{8}$

2. $-1\frac{1}{6} + 2\frac{2}{3}$

3. $4\frac{1}{2} - 7\frac{7}{8}$

4. $-3\frac{5}{6} - (4\frac{1}{12})$

5. $\frac{5}{18} + \frac{7}{12}$

6. $-4\frac{7}{20} + 3\frac{9}{10}$

7. $5\frac{8}{21} - (-3\frac{1}{7})$

8. $1\frac{19}{24} + 2\frac{23}{20}$

9. $3\frac{16}{25} - 4\frac{7}{20}$

MULTIPLYING AND DIVIDING RATIONAL NUMBERS

Accentuate the Negative

Use the algorithms you developed to find each value.

1. $-\frac{1}{6} \cdot 2\frac{3}{4}$

2. $\frac{3}{16} \div \left(-\frac{1}{8}\right)$

3. $-\frac{31}{56} \cdot (-8)$

4. $-5\frac{7}{12} \div 12$

5. $-8 \div \frac{1}{4}$

6. $-3\frac{1}{6} \div \left(-2\frac{1}{12}\right)$

7. $8\frac{3}{4} \cdot 3\frac{7}{8}$

8. $-\frac{11}{12} \div \frac{5}{6}$

9. $4\frac{9}{28} \cdot (-7)$

10. $-1\frac{1}{15} \div 15$

11. $-3 \div \frac{3}{4}$

12. $-2\frac{7}{8} \div 3\frac{3}{4}$

FRACTIONS

1. Suppose you have $2\frac{1}{2}$ oranges. If a student serving consists of $\frac{3}{4}$ of an orange, how many student servings (including parts of a serving) can you make?
2. Suppose instead that you have $1\frac{1}{2}$ oranges. If this is enough to make $\frac{3}{5}$ of an adult serving, how many oranges (and parts of an orange) make up 1 adult serving?
3. Sarah is making posters by hand to advertise her school play, but her posters are not the same length as a standard sheet of paper (the width is the same, though). She has $3\frac{1}{2}$ sheets of paper left over, which she says is enough to make $2\frac{1}{3}$ posters. How many sheets of paper (and parts of a sheet) does each poster use?
4. If Alberto is also making posters, but his posters only use $\frac{2}{3}$ of a sheet of paper, how many of Alberto's posters will those $3\frac{1}{2}$ sheets of paper make?

FRACTIONS

5. Carmen is tying ribbons in bows on boxes. She uses $2\frac{1}{4}$ feet of ribbon on each box. If she has $7\frac{1}{2}$ feet of ribbon left, how many bows (or parts of bows) can she make?
6. Pat is also tying ribbons into bows. Pat sees the same $7\frac{1}{2}$ feet of ribbon measured out and says "Since my bows are bigger than Carmen's, there is only enough for me to make $2\frac{1}{4}$ bows." How much ribbon does Pat use on each bow?
7. Anuj has been serving $\frac{2}{3}$ cup of lemonade to each student. If he has $1\frac{1}{2}$ cups of lemonade left, how many students can still get lemonade? How much of a serving will the last student get?
8. $3\frac{1}{2}$ cups of lemonade will fill $2\frac{1}{3}$ glasses. How many cups of lemonade does each glass hold?

DISTRIBUTIVE PROPERTY

Say It With Symbols

Use the Distributive Property to write each expression in expanded form.

1. $2(x + 6)$

2. $-5(8 - b)$

3. $4(-x + 7)$

4. $-\frac{3}{4}(12 - 16d)$

5. $\frac{2}{3}(6h - 1)$

6. $(-3.2x + 2.1)(-6)$

7. $3.5(3x - 8)$

8. $4(x + 7)$

9. $-2.5(2a - 4)$

10. $\frac{2}{3}(12 - 15d)$

11. $-2(k - 11)$

12. $-\frac{1}{3}(6h + 15)$

EVALUATING EXPRESSIONS 2

For Exercises 1-14, evaluate the expression for the given value of x .

1. $3.5x - 10$ when $x = 2$

2. $45 - 2x$ when $x = 6$

3. $-3 - x$ when $x = \frac{1}{2}$

4. $4x + 9$ when $x = 11$

5. $2x^2$ when $x = 8$

6. $11 - 3x^2$ when $x = 1$

7. $4.5 + x^2$ when $x = 1.5$

8. $6x^2 + 13$ when $x = -10$

9. $6x^2 + x - 11$ when $x = 2$

10. $6x^2 + x - 11$ when $x = -2$

11. $12 - 2x^2 + 5x$ when $x = -4$

12. $12 - 2x^2 + 5x$ when $x = 4$

13. $x(31 - x)$ when $x = 3$

14. $\frac{3(16 - x)}{2x}$ when $x = 10$

EQUATIONS

Solve each equation. Show your work. Check your solution.

1. $x - 7 = 3$

2. $x + 2 = -11$

3. $-17 = p - 13$

4. $q + 12 = 3$

5. $-15t + -60$

6. $-5 = \frac{s}{-11}$

7. $\frac{c}{-6.1} = -9$

8. $\frac{a}{20} = -4$

9. $b + 5.6 = -8.4$

10. $y - 3.8 = 5.2$

11. $2 = -4z$

EQUATIONS

12. $y - 6 = -3$

13. $\frac{m}{-3} = -15$

14. $-5f = -75$

15. $-36 = 9d$

16. $\frac{x}{2} = -14$

17. $6n + 17 = 53$

18. $245 = 25n - 5$

19. $\frac{x}{3} + 2 = 14$

20. $\frac{w}{4} - 7 = -5$

LET'S PAINT !

Perimeter and Area

1. You get a job with the maintenance department of an apartment rental company. Your boss wants you to estimate the amount of paint needed for the next month. He tells you that you can paint 400 square feet with each gallon of wall paint. Fill in the missing values to complete the table.

Job Number	Wall Width(feet)	Wall Height(feet)	Area(square feet)
1	7 feet	8 feet	
2	16 feet	8 feet	
3	12 feet	10 feet	
4	14 feet	10 feet	
5	18 feet		180 square feet
6	10 feet		120 square feet
7	16 feet		192 square feet
8		12 feet	216 square feet
9		12 feet	288 square feet

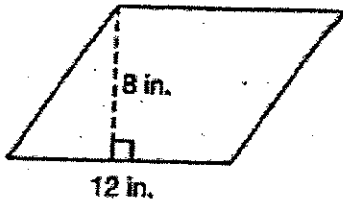
2. Find the total area to be painted for all of the jobs.
3. Use the result of question 2 to determine the number of gallons of paint that you need to purchase to do all of the painting.
4. Suppose that you need to put trim around the edges of the wall that has a width of 16 feet and a height of 12 feet. How many 8 foot pieces of trim do you need to purchase?

CITY PLANNING

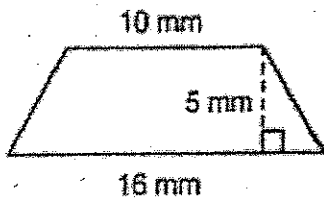
Areas of Parallelograms, Triangles, Trapezoids and Composite Figures.

Write the formula and find the area for each figure.

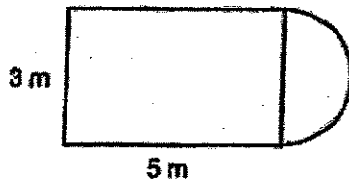
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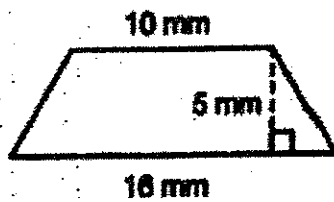
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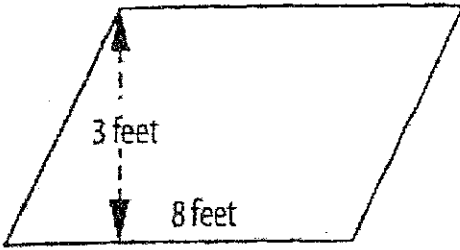
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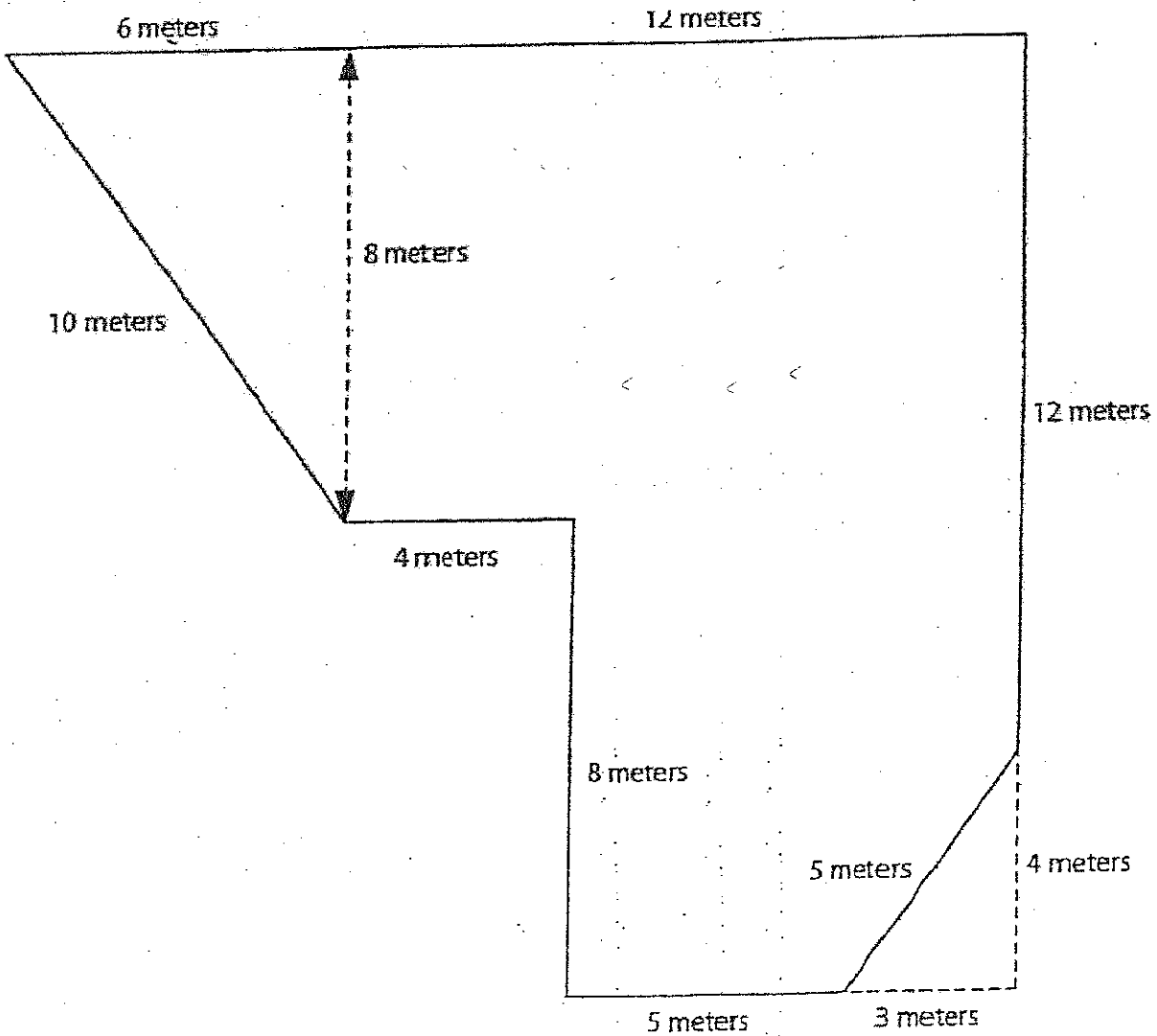
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5.

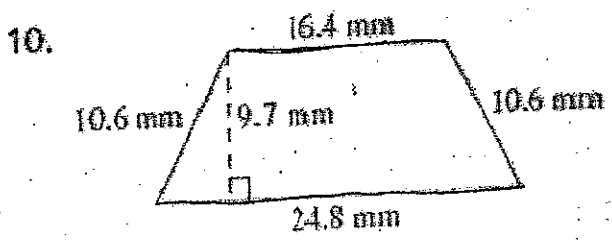
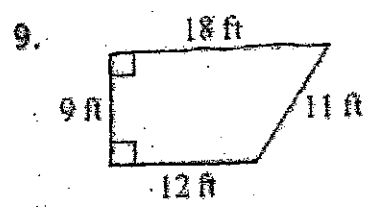
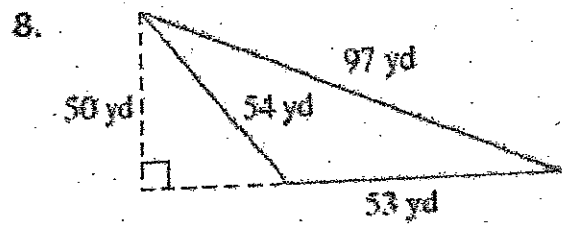
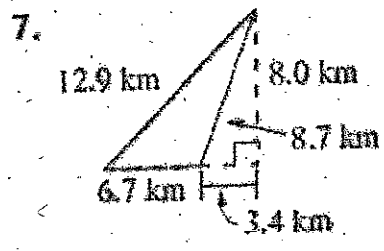
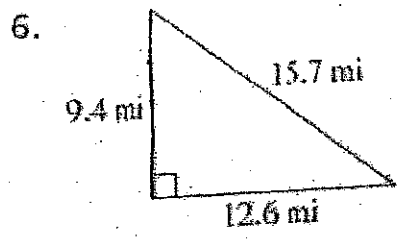
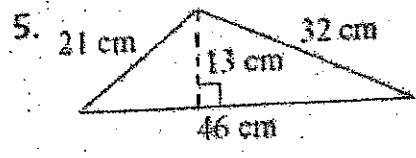
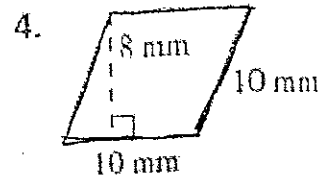
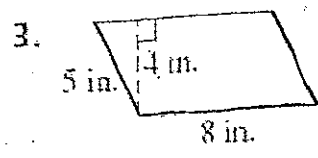
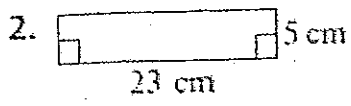
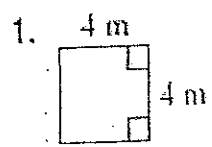


6. The city wants to create a garden according to the plan below. Find the **area** and **perimeter** of the garden.

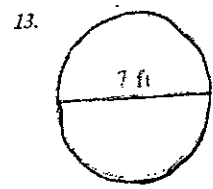
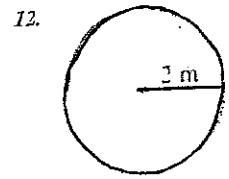
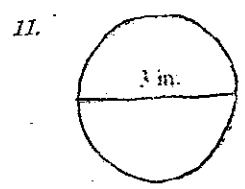


AREA REVIEW

Find the area of each figure.



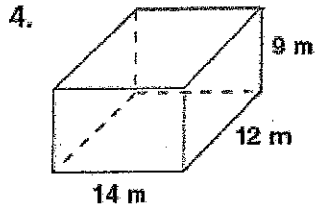
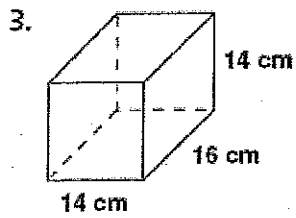
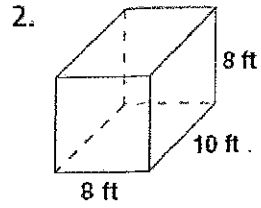
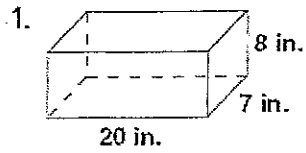
Find the perimeter and area of each figure.



VOLUME

Filling and Wrapping

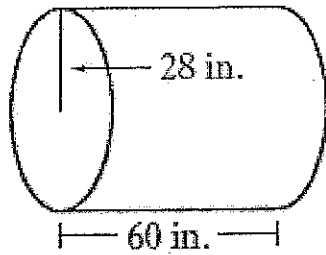
Find the volume of each closed box.



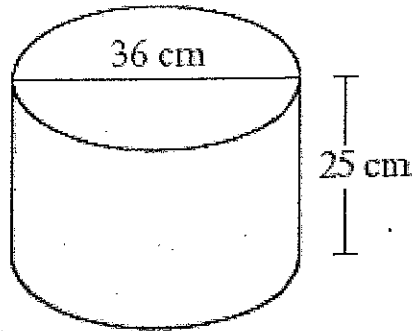
VOLUME 2

Find the volume of each cylinder. Write the formula.

1.



2.



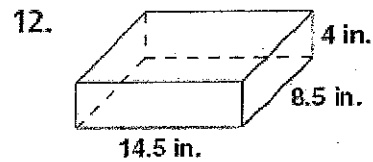
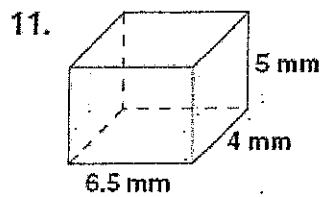
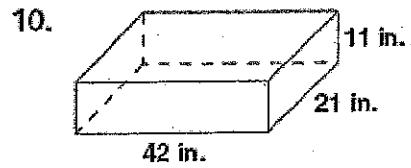
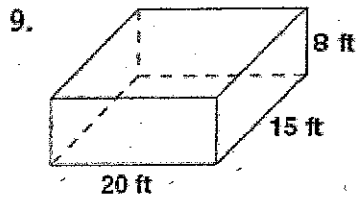
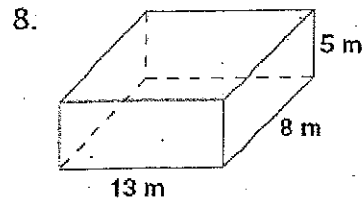
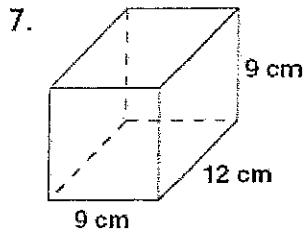
3. A water storage tank has a cylindrical shape. The base has a diameter of 18 meters and the tank is 32 meters high. How much water, to the nearest cubic unit, can the tank hold?

4. A cylindrical juice container is 9 inches tall and has a radius of 2 inches. What is the volume of the container to the nearest whole unit?

SURFACE AREA

Filling and Wrapping

Find the surface area of each prism.



PERCENTS

The items below were purchased in a city with a sales tax rate of 5%. Find the amount of sales tax on each purchase.

1. A DVD for \$18.00
2. A computer hard drive for \$140.00
3. A bathing suit for \$65.00
4. A bicycle for \$150.00

A shoe store is having a 25% off sale on all of its shoes. Calculate the discount on each of the pairs of shoes that sell for the original price listed below.

5. Men's running shoes for \$85.00
6. Women's cross training shoes for \$50.00
7. Softball cleats for \$29.95
8. Golf shoes for \$120