BMHS Grade 8 Exit

Review and Practice

Get Ready for Grade 9 Multiplication Tables Worked Examples and Practice

Example 1: Use your knowledge of multiplication tables to evaluate each of the following.

a) 6×7 **b)** 5×8 **c)** 9×12 **d)** 10×11

Solution:

You must memorize the multiplication table shown.

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

a) $6 \times 7 = 42$

b) $5 \times 8 = 40$

c) $9 \times 12 = 108$

d) $10 \times 11 = 110$

Example 2: Use your knowledge of multiplication tables to find two single-digit integers that multiply to give each of the following numbers.

a) 45 **b)** 56 **c)** 72 **d)** 21

Solution:

a) $45 = 5 \times 9$ **b)** $56 = 7 \times 8$ **c)** $72 = 8 \times 9$ **d)** $21 = 3 \times 7$

Example 3: Find the smallest number that is divisible by 2, 3, 4, 5, and 6.

Solution: Since 2 is a factor, the number must be even. Since 5 is a factor, the number must end in 5 or 0. Therefore, possible candidates are 10, 20, 30, 40, 50, and 60. Your knowledge of the multiplication tables will show that only 60 is also divisible by 4 and by 6. Therefore, the answer is 60.

Example 4: Find all of the numbers between 3 and 12 which divide evenly into 36.

Solution: Your knowledge of the multiplication tables can be used to show that the numbers are 3, 4, 6, 9, and 12.

Practice:

1. Use your knowledge of multiplication tables to evaluate each of the following.

a) 9×4 **b)** 6×8 **c)** 11×12 **d)** 10×6

2. Use your knowledge of multiplication tables to find two single-digit integers that multiply to the given number.

a) 27 **b)** 54 **c)** 63 **d)** 35

3. Find the smallest number that is divisible by 2, 6, and 10.

4. Find all of the numbers between 3 and 12 which divide evenly into 48.

Answers:

1. a) 36 b) 48 c) 132 d) 60

2. a) 3×9 b) 6×9 c) 7×9 d) 5×7

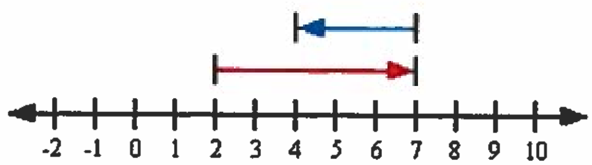
3. 30

4. 3, 4, 6, 8, 12

Get Ready for Grade 9 Integers Worked Examples and Practice

Example 1: Add $(+2)+(+5)+(-3)$.

Solution: You can use a number line to help you visualize the operations.



$$\begin{aligned}(+2)+(+5)+(-3) &= 2+5-3\\ &= 7-3\\ &= 4\end{aligned}$$

Example 2: Subtract $(+5)-(+2)-(-4)$.

Solution: To subtract an integer, add the opposite.

$$\begin{aligned}(+5)-(+2)-(-4) &= (+5)+(-2)+(+4)\\ &= 5-2+4\\ &= 3+4\\ &= 7\end{aligned}$$

Example 3: Multiply $(+3)\times(-4)$.

Solution: The multiplication and division rules for integers can be summarized in the table shown. Multiplying a positive integer by a negative integer has a negative result.

	+	−
+	+	−
−	−	+

$(+3)\times(-4)=-12$

Example 4: Divide $-15\div(-3)$.

Solution: Refer to the table in Example 3. Dividing a negative integer by a negative integer has a positive result.

$$\frac{-15}{-3}=5$$

Practice:

1. a) Add $(-4)+(+6)+(-1)$.

b) Add 2 + 8 + (−3).

c) Add −12 + 8 + (−2).

2. a) Subtract $(+8)-(+2)-(-3)$.

b) Subtract 9 − 4 − (−3).

c) Subtract −6 − 5 − (−14).

3. a) Multiply $(-4)\times(-5)$.

b) $8\times(-3)$.

c) $-7\times(-2)$.

4. a) Divide $\frac{+18}{-6}$.

b) Divide $36\div(-9)$.

c) Divide $-14\div(-7)$.

Answers:

1. a) 1 b) 7 c) −6

2. a) 9 b) 8 c) 3

3. a) 20 b) −24 c) 14

4. a) −3 b) −4 c) 2

MATC9 Get Ready for Grade 9 Fractions Worked Examples and Practice

Example 1: a) Reduce $\frac{24}{36}$ to lowest terms.

b) Reduce $\frac{105}{120}$ to lowest terms.

Solution: a) Look for numbers that divide evenly into the numerator and denominator. In this question, both are divisible by 12.

$$\begin{aligned}\frac{24}{36} &= \frac{24 \div 12}{36 \div 12} \\ &= \frac{2}{3}\end{aligned}$$

b) Sometimes it is difficult to determine the largest common factor for the numerator and denominator. You can do the reduction in several steps.

$$\begin{aligned}\frac{105}{120} &= \frac{105 \div 5}{120 \div 5} \\ &= \frac{21}{24} \\ &= \frac{21 \div 3}{24 \div 3} \\ &= \frac{7}{8}\end{aligned}$$

Example 2: a) Express $2\frac{3}{4}$ as an improper fraction.

b) Express $\frac{14}{5}$ as a mixed number.

Solution: a) You have 2 wholes of 4 quarters each, making 8 quarters. Add the remaining 3 quarters to arrive at an answer of $\frac{11}{4}$.

You can achieve the same result using the algorithm "denominator times whole plus numerator." The answer is again $\frac{11}{4}$.

$$2\frac{3}{4} \qquad 4 \times 2 + 3 = 11$$

b) Divide 14 by 5. The quotient of 2 gives you the whole number, and the remainder of 4 gives you the numerator. The answer is $2\frac{4}{5}$.

$$\begin{array}{r} 2 \\ 5\overline{)14} \\ \underline{10} \\ 4 \end{array}$$

Example 3: Express the fraction $\frac{5}{8}$ with a denominator of 24.

Solution: Divide the desired denominator by the given denominator: $\frac{24}{8} = 3$. Then, multiply the numerator and denominator of the fraction by the result.

$$\frac{5 \times 3}{8 \times 3} = \frac{15}{24}$$

Example 4: **a)** Add $\frac{3}{4} + \frac{2}{3}$. **b)** Subtract $3\frac{2}{5} - 2\frac{1}{4}$.

Solution: a) To add or subtract fractions, they must have the same denominator. Find the smallest number that both given denominators will divide into evenly. This is called the "lowest common denominator." In this question, the lowest common denominator is 12. Express each fraction with the denominator of 12, and add the numerators.

$$\begin{aligned}\frac{3}{4} + \frac{2}{3} &= \frac{3 \times 3}{4 \times 3} + \frac{2 \times 4}{3 \times 4} \\ &= \frac{9}{12} + \frac{8}{12} \\ &= \frac{17}{12} \\ &= 1\frac{5}{12}\end{aligned}$$

b) Change each mixed number into an improper fraction. Then, use the lowest common denominator of 20, and subtract.

$$\begin{aligned}3\frac{2}{5} - 2\frac{1}{4} &= \frac{17}{5} - \frac{9}{4} \\ &= \frac{17 \times 4}{5 \times 4} - \frac{9 \times 5}{4 \times 5} \\ &= \frac{68}{20} - \frac{45}{20} \\ &= \frac{23}{20} \\ &= 1\frac{3}{20}\end{aligned}$$

Example 5: a) Multiply $\frac{3}{5}\times\frac{6}{7}$. **b)** Multiply $4\frac{1}{5}\times 2\frac{2}{3}$.

Solution: a) When multiplying fractions, multiply the numerators and the denominators.

$$\begin{aligned}\frac{3}{5}\times\frac{6}{7} &= \frac{3\times 6}{5\times 7}\\ &= \frac{18}{35}\end{aligned}$$

b) Change each mixed number to an improper fraction. Then, multiply the numerators and denominators. **Hint:** cancel any common factors before multiplying.

$$\begin{aligned}4\frac{1}{5}\times 2\frac{2}{3} &= \frac{21}{5}\times\frac{8}{3}\\ &= \frac{7}{5}\times\frac{8}{1}\\ &= \frac{56}{5}\\ &= 11\frac{1}{5}\end{aligned}$$

Example 6: a) Divide $\frac{2}{5} \div \frac{4}{9}$. **b)** Divide $3\frac{1}{5} \div 2\frac{2}{3}$.

Solution: a) When dividing fractions, multiply the first fraction by the reciprocal of the second fraction. This is known as the "invert and multiply" rule. **Hint:** cancel any common factors before multiplying.

$$\begin{aligned} \frac{2}{5} \div \frac{4}{9} &= \frac{2}{5} \times \frac{9}{4} \\ &= \frac{1}{5} \times \frac{9}{2} \\ &= \frac{9}{10} \end{aligned}$$

b) Change each mixed number to an improper fraction. Then, multiply the first fraction by the reciprocal of the second fraction.

$$\begin{aligned} 3\frac{1}{5} \div 2\frac{2}{3} &= \frac{16}{5} \div \frac{8}{3} \\ &= \frac{16}{5} \times \frac{3}{8} \\ &= \frac{2}{5} \times \frac{3}{1} \\ &= \frac{6}{5} \\ &= 1\frac{1}{5} \end{aligned}$$

Example 7: **a)** Multiply $5\times\frac{4}{7}$. **b)** Multiply $3\times2\frac{4}{9}$.

Solution: **a)** The whole number 5 is understood to be over a denominator of 1.

$$
\begin{aligned}
5\times\frac{4}{7} &= \frac{5}{1}\times\frac{4}{7}\\
&= \frac{20}{7}\\
&= 2\frac{6}{7}
\end{aligned}
$$

b) Change the mixed number to an improper fraction before multiplying. **Hint:** cancel any common factors before multiplying.

$$
\begin{aligned}
3\times2\frac{4}{9} &= 3\times\frac{22}{9}\\
&= 1\times\frac{22}{3}\\
&= \frac{22}{3}\\
&= 7\frac{1}{3}
\end{aligned}
$$

Example 8: Simplify $\left(\frac{2}{5}+\frac{3}{4}\right)\div\left(2\frac{1}{3}-1\frac{1}{4}\right)$.

Solution: Use BEDMAS rules.

$$
\begin{aligned}
\left(\frac{2}{5}+\frac{3}{4}\right)\div\left(2\frac{1}{3}-1\frac{1}{4}\right) &= \left(\frac{8}{20}+\frac{15}{20}\right)\div\left(\frac{7}{3}-\frac{5}{4}\right)\\
&= \left(\frac{23}{20}\right)\div\left(\frac{28}{12}-\frac{15}{12}\right)\\
&= \left(\frac{23}{20}\right)\div\left(\frac{13}{12}\right)\\
&= \left(\frac{23}{20}\right)\times\left(\frac{12}{13}\right)\\
&= \left(\frac{23}{5}\right)\times\left(\frac{3}{13}\right)\\
&= \frac{69}{65}\\
&= 1\frac{4}{65}
\end{aligned}
$$

Practice:

1. a) Reduce $\frac{42}{48}$ to lowest terms.

b) Reduce $\frac{264}{384}$ to lowest terms.

2. a) Express $5\frac{3}{7}$ as an improper fraction.

b) Express $\frac{32}{9}$ as a mixed number.

3. Express $\frac{3}{11}$ with a denominator of 44.

4. a) Add $\frac{2}{3}+\frac{3}{5}$.

b) Subtract $3\frac{2}{7}-2\frac{1}{2}$.

5. a) Multiply $\left(\frac{5}{8}\right)\left(\frac{4}{11}\right)$.

b) Multiply $\left(1\frac{3}{4}\right)\left(2\frac{3}{14}\right)$.

6. a) Divide $\left(\frac{4}{9}\right)\div\left(\frac{2}{3}\right)$.

b) Divide $\left(1\frac{2}{9}\right)\div\left(7\frac{1}{3}\right)$.

7. a) Multiply $7 \times \frac{4}{5}$.

b) Multiply $3 \times 4\frac{3}{4}$.

8. Simplify $\left(\frac{3}{4} - \frac{2}{3}\right) \div \left(1\frac{1}{3} + 2\frac{1}{4}\right)$.

Answers:

1. a) $\frac{7}{8}$ b) $\frac{11}{16}$ 2. a) $\frac{38}{7}$ b) $3\frac{5}{9}$ 3. $\frac{12}{44}$ 4. a) $1\frac{4}{15}$ b) $\frac{11}{14}$

5. a) $\frac{5}{22}$ b) $3\frac{7}{8}$ 6. a) $\frac{2}{3}$ b) $\frac{1}{6}$ 7. a) $5\frac{3}{5}$ b) $14\frac{1}{4}$ 8. $\frac{1}{43}$

Get Ready for Grade 9 Ratio and Proportion Worked Examples and Practice

Example 1: Moshe purchased 24 muffins for $10. Express the ratio between the number of muffins and the cost in lowest terms.

Solution:

$$r = \frac{24}{10}$$
$$= \frac{12}{5}$$
$$= 12 : 5$$

Example 2: Tests by an independent laboratory show that a 4 L can of concrete paint will cover 27 m^2 of cement floor. Suzette's Auto Repair has a floor with an area of 81 m^2. How many litres of paint will she need to paint it?

Solution: The ratio of area to volume of paint is 4:27, or $\frac{4}{27}$. Suzette needs to express this with a denominator of 81.

$\frac{81}{27} = 3$ Therefore,

$$\frac{4}{27} = \frac{4 \times 3}{27 \times 3}$$
$$= \frac{12}{81}$$

Suzette needs 12 L of paint.

Example 3: Serena's Catering Service mixes large batches of tropical fruit punch using 12 L of orange juice, 9 L of papaya juice, and 6 L of mango juice. Express this ratio in lowest terms.

Solution: The ratio is 12:9:6. The greatest common factor is 3.

$$12 : 9 : 6 = \frac{12}{3} : \frac{9}{3} : \frac{6}{3}$$
$$= 4 : 3 : 2$$

Example 4: How many litres of punch will result from the recipe given in Example 3?

Solution: The number of litres of punch can be calculated by adding the volumes of the juices used:

$12 + 9 + 6 = 27$ L

Example 5: Serena has purchased a 135 L cooler so that she can make and store the punch in a large batch. How many litres of each juice will she need to fill the cooler?

Solution: One recipe makes 27 L of punch.

$$\frac{135}{27} = 5$$

Suzette needs 5 recipes.

$$\begin{aligned} 12:9:6 &= 12 \times 5 : 9 \times 5 : 6 \times 5 \\ &= 60:45:30 \end{aligned}$$

She needs 60 L of orange juice, 45 L of papaya juice, and 30 L of mango juice.

Practice:

1. Heinz bought a basket of apples at the market for $8. He counted the apples, and found that there were 52 in the basket. Express the ratio of the number of apples to the cost in lowest terms.

2. Roof shingles come in a packet of 12, which covers 17 m^2 of roof. Sandra's garage roof has an area of 102 m^2. How many shingles does she need?

3. Sales records show that sales of small, medium and large sizes of Rice Bubbles cereal sold 12, 32, and 24 boxes in one week. Express this ratio in lowest terms.

4. How many boxes of cereal were sold during the week?

5. Sammy has been given the job of making a display using 408 boxes of cereal. How many of each size should he use to match the sales ratio?

Answers:

1. 13:2 2. 72 3. 3:8:6 4. 68 5. 72:192:144

Get Ready for Grade 9 Rate and Unit Rate Worked Examples and Practice

Example 1: Jozefina's Contracting paid $60 000 to have bathrooms installed in a 12-unit apartment building that was under construction. What was the unit rate per bathroom?

Solution: To find the unit rate, divide the cost by the number of units, and reduce to lowest terms.

$$\frac{60\,000}{12} = \$5000\,/\,\text{bathroom}$$

Example 2: Bryan expected that about 500 patients would attend his flu shot clinic. He brought 250 mL of flu vaccine to the clinic. What was the expected unit rate of vaccine per patient, expressed as a decimal?

Solution: To find the unit rate, divide the volume of vaccine by the number of patients, and convert to a decimal.

$$\begin{aligned}\frac{250}{500} &= \frac{1}{2}\\ &= 0.5\ \text{mL/patient}\end{aligned}$$

Example 3: Basiruddin kept records showing that 30 of the 150 computers brought to him for repair in one month were infected with the XX77 virus. Express the rate of infection as a percent.

Solution: To find the infection rate as a percent, divide the number of computers infected by the total number of computers, and convert to a percent.

$$\begin{aligned}\frac{30}{150} &= \frac{1}{5}\\ &= 0.20\\ &= 20\%\end{aligned}$$

Example 4: Giselle rode her bicycle at a rate of 12 km/h for half an hour. How far did she go?

Solution: The unit rate is 12 km every hour. To find the total distance travelled, multiply the unit rate by the number of hours.

$$\begin{aligned}d &= 12 \times 0.5\\ &= 6\ \text{km}\end{aligned}$$

Example 5: The management of an amusement park kept records to show that visitors lost personal items at a rate of 0.03 items/visitor. The park hosted 2500 visitors on a busy Saturday. How many lost items were expected?

Solution: The unit rate is 0.03 items per visitor. To find the expected number of lost items, multiply the unit rate by the number of visitors.

$0.03 \times 2500 = 75$

Example 6: The Moon Life Insurance company pays a claim on 1.5% of the policies that it underwrites. A total of 1200 new policies were underwritten during a month. How many claims are expected?

Solution: The unit rate is 1.5%. Convert this to a decimal, and multiply by the number of policies.

$$\begin{aligned} 1.5\% \text{ of } 1200 &= 0.015 \times 1200 \\ &= 18 \text{ claims} \end{aligned}$$

Practice:

1. Tom's Crispy Donut Shoppe sold 8400 donuts during its first week of operation. Tom's is open every day. Find the daily unit sales rate.

2. Maha's house is on a one-way street. She counted 24 automobiles passing in a one hour period. Of these, 3 went the wrong way down the street. What is the rate of cars going the wrong way, expressed as a decimal?

3. Of the 160 patients who made appointments to see a dentist in a week, 8 did not arrive for their appointments. Find the rate of "no-shows," expressed as a percent.

4. A light aircraft burns 35 L of fuel per hour. How much fuel is needed for a 2.4 hour flight?

5. A swimming pool manual recommends adding 0.0004 L of chlorine solution per litre of pool water. How much chlorine solution should be added to a pool with a volume of 5000 L?

6. The Real Time Watch Company expects that 0.2% of its watches will be returned for service under a one-year warranty. If 4500 watches were sold in a month, how many of those are expected to be returned for warranty service?

Answers:

1. 1200 donuts/day 2. 0.125 3. 5% 4. 84 L 5. 2 L 6. 9 watches.

Get Ready for Grade 9 Modelling With Equations Worked Examples and Practice

Example 1: Julio is twice as old as his cousin Juanita. The sum of their ages is 27. How old are Julio and Juanita?

Solution: Let Juanita's age be represented by x. Julio's age is $2x$.

$$\begin{aligned} 2x + x &= 27 \\ 3x &= 27 \\ \frac{3x}{3} &= \frac{27}{3} \\ x &= 9 \end{aligned}$$

Juanita is 9, and Julio is 18.

Example 2: A truck with a snow plow costs $5000 more than a truck without. Viola bought one of each to use in her trucking business, and paid $125 000 in total. What is the cost of just the truck?

Solution: Let the cost of the truck be c. The cost of the truck with the snow plow is $c + 5000$.

$$\begin{aligned} c + c + 5000 &= 125\,000 \\ 2c + 5000 &= 125\,000 \\ 2c + 5000 - 5000 &= 125\,000 - 5000 \\ 2c &= 120\,000 \\ \frac{2c}{2} &= \frac{120\,000}{2} \\ c &= 60\,000 \end{aligned}$$

The cost of the truck is $60 000.

Example 3: Sally and Charlie have college savings accounts. Sally has twice as much money as Charlie, plus another $250. The total of their accounts is $4750. How much money does Charlie have in his account?

Solution: Let the amount of money in Charlie's account be m dollars. The amount in Sally's account is $2m + 250$.

$$\begin{aligned} m + 2m + 250 &= 4750 \\ 3m + 250 - 250 &= 4750 - 250 \\ 3m &= 4500 \\ \frac{3m}{3} &= \frac{4500}{3} \\ m &= 1500 \end{aligned}$$

Charlie has $1500 in his account.

Example 4: An orange costs 25 cents more than an apple. Astrid bought five of each. The total cost was $6.25. How much was an apple?

Solution: Let the cost of an apple be a. The cost of an orange is $a + 25$.

$$
\begin{aligned}
5a + 5(a + 25) &= 625 \\
5a + 5a + 125 &= 625 \\
10a + 125 - 125 &= 625 - 125 \\
10a &= 500 \\
\frac{10a}{10} &= \frac{500}{10} \\
a &= 50
\end{aligned}
$$

An apple costs 50 cents.

Practice:

1. A twin-engine Cessna 310 burns three times as much fuel as a single-engine Piper Cherokee. A flying club flew both aircraft to a fly-in air show. On arrival, it took 200 L of fuel to refill the tanks on both aircraft. How much fuel was burned by the Cherokee?

2. It costs $3000 more to pave a driveway with concrete than with asphalt. Laura and Roberto are neighbours with identical driveways. One was paved with concrete, and the other with asphalt. The total bill was $15 000. How much did the asphalt driveway cost?

3. Bela has five more than three times as many sheep on his farm than John. Together, they have 565 sheep. How many sheep does John have?

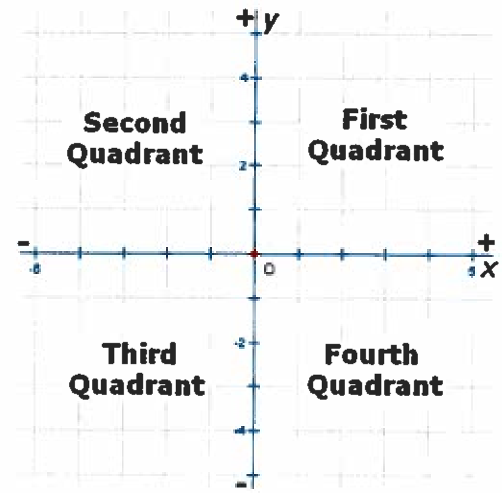
4. A copy centre charges an extra 5 cents for coloured copies compared to standard copies. Erika needed 100 standard copies and 50 coloured copies. She paid a total of $8.50. How much does a standard copy cost?

Answers: 1. 50 L 2. $6000 3. 140 sheep 4. 4 cents.

Get Ready for Grade 9 Plotting Points Worked Examples and Practice

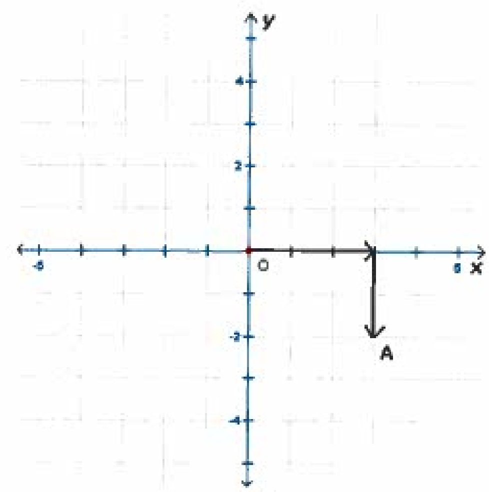
Example 1: What quadrant does the point P(−2, 1) lie in?

Solution: The positive and negative directions of the *x*- and *y*-axes, as well as the quadrants, are shown. Since the *x*-coordinate is negative, and the *y*-coordinate is positive, the point lies in the second quadrant.



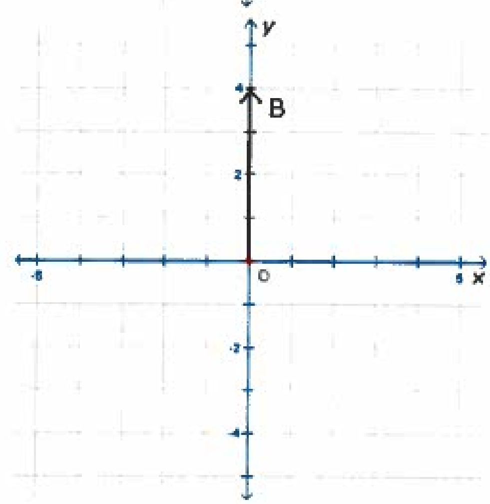
Example 2: Plot the point A(3, −2).

Solution: The *x*-coordinate is positive. Move 3 units to the right. The *y*-coordinate is negative. Move 2 units down.



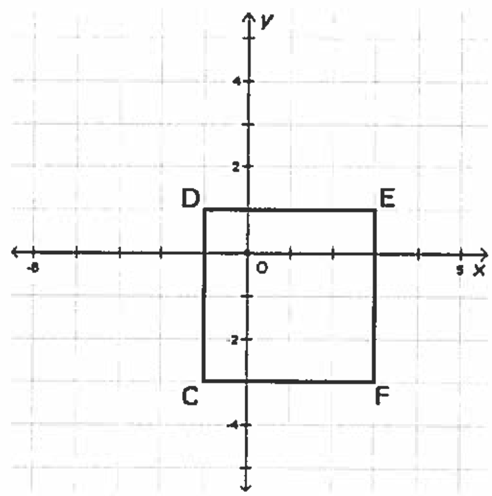
Example 3: Plot the point B(0, 4).

Solution: The *x*-coordinate is 0. Therefore, point *B* lies on the *y*-axis. The *y*-coordinate is positive. Move up 4 units.



Example 4: Plot the points C(−1, −3), D(−1, 1), E(3, 1) and F(3, −3). What geometric shape is formed by joining the points?

Solution: The plotted points are shown. The shape is a square.



Practice:

1. What quadrant does the point Q(5, −2) lie in?

2. Give directions, from the origin, for plotting the point R(−3, −4).

3. Describe the location of the point S(4, 0).

4. Plot the points G(−2, −4), H(−1, 2), I(5, 2) and J(4, −4). What geometric figure is formed by joining the points?

Answers:

1.fourth quadrant
2. left 3 units and down 4 units
3. on the *x*-axis and right 4 units
4. a parallelogram

Get Ready for Grade 9 Translating Phrases into Algebraic Expressions Worked Examples and Practice

Example 1: Express in algebraic terms:

a) three more than a number.

b) twice a number.

c) two less than three times a number.

Solution: Let the number be represented by n.

a) $n + 3$

b) $2n$

c) $3n - 2$

Example 2: Express in algebraic terms:

a) two hundred dollars plus 10% of the profit.

b) half price plus 15% tax.

c) double the take-off distance for the wet runway less 20% for the headwind.

Solution: **a)** Let the profit be represented by P.

$200 + 0.1P$

b) Let the price be represented by P.

$\frac{1}{2}P + 0.15P$

c) Let the take-off distance be represented by d.

$2d - 0.20d$

Practice:

1. Express in algebraic terms:

a) five less than a number.

b) four times a number.

c) 15 more than ten times a number.

2. Express in algebraic terms:

a) Six litres per hour fuel consumption plus 15% for the age of the car.

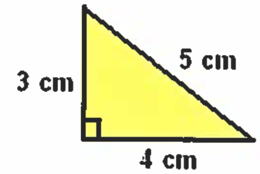
b) double tuition for an out-of-province student less 10% for early payment.

c) triple the fine for speeding in a construction zone plus $50 for failing to produce proof of insurance.

Answers: 1. a) $n - 5$ b) $4n$ c) $10n + 15$ 2. a) $6 + 0.15f$ b) $2t - 0.10t$ c) $3f + 50$

MATC9 Get Ready for Grade 9 Area and Perimeter Worked Examples and Practice

Example 1: Find the area and perimeter of the triangle shown.



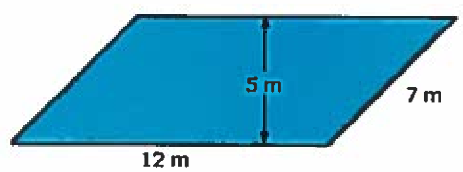
Solution: The area of a triangle is given by $A = \frac{1}{2}bh$. The base of the given triangle is 4 cm, and the height is 3 cm.

$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2} \times 4 \times 3 \\ &= 6 \text{ cm}^2 \end{aligned}$$

The perimeter of a triangle is calculated by adding the lengths of the three sides.

$$\begin{aligned} P &= a + b + c \\ &= 3 + 4 + 5 \\ &= 12 \text{ cm} \end{aligned}$$

Example 2: Find the area and perimeter of the parallelogram shown.



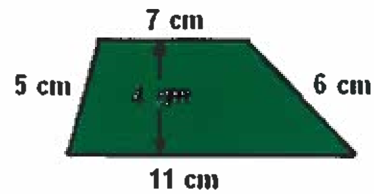
Solution: The area of a parallelogram is given by $A = bh$. The base of the given parallelogram is 12 m, and the height is 5 m.

$$\begin{aligned} A &= bh \\ &= 12 \times 5 \\ &= 60 \text{ m}^2 \end{aligned}$$

The perimeter of a parallelogram is calculated by adding the lengths of the four sides.

$$\begin{aligned} P &= a + b + c + d \\ &= 7 + 12 + 7 + 12 \\ &= 38 \text{ m} \end{aligned}$$

Example 3: Find the area and perimeter of the trapezoid shown.



Solution: The area of a trapezoid is given by $A = \frac{1}{2}h(a+b)$. In the trapezoid shown, $a = 11$, $b = 7$, and $h = 4$.

$$\begin{aligned} A &= \frac{1}{2}h(a+b) \\ &= \frac{1}{2} \times 4 \times (11+7) \\ &= 36 \text{ cm}^2 \end{aligned}$$

The perimeter of a trapezoid is calculated by adding the lengths of the four sides.

$$\begin{aligned} P &= a+b+c+d \\ &= 5+7+6+11 \\ &= 29 \text{ cm} \end{aligned}$$

Example 4: Find the area and perimeter of the circle shown.

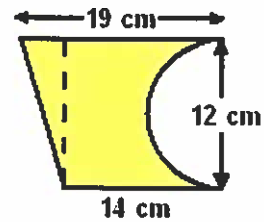
Solution: The area of a circle is given by $A = \pi r^2$. The radius of the circle shown is 8 m.

$$\begin{aligned} A &= \pi r^2 \\ &= \pi (8)^2 \\ &= 201.1 \text{ m}^2 \end{aligned}$$

The perimeter, or circumference, of a circle is given by $C = 2\pi r$.

$$\begin{aligned} C &= 2\pi r \\ &= 2\pi(8) \\ &= 50.3 \text{ m} \end{aligned}$$

Example 5: Find the area and perimeter of the composite shape shown.



Solution: The area of the figure can be calculated by finding the area of the trapezoid and subtracting the area of the semicircle.

Area of trapezoid:

$$
\begin{aligned}
A &= \frac{1}{2}h(a+b) \\
&= \frac{1}{2}\times 12\times(14+19) \\
&= 198\ \text{cm}^2
\end{aligned}
$$

Area of semicircle:

$$
\begin{aligned}
A &= \frac{1}{2}\pi r^2 \\
&= \frac{1}{2}\times \pi \times 6^2 \\
&= 57\ \text{cm}^2
\end{aligned}
$$

The area of the figure is $198 - 57 = 141$ cm^2.

The perimeter of the figure can be calculated by adding the three sides of the trapezoid to the perimeter of the semicircle. The unknown side of the trapezoid can be determined using the Pythagorean theorem.

$$
\begin{aligned}
c^2 &= 5^2 + 12^2 \\
&= 169 \\
c &= 13\ \text{cm}
\end{aligned}
$$

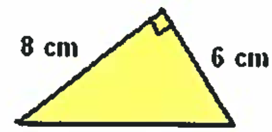
The perimeter of the semicircle can be calculated:

$$
\begin{aligned}
P &= \frac{1}{2}(2\pi r) \\
&= \pi \times 6 \\
&= 19\ \text{cm}
\end{aligned}
$$

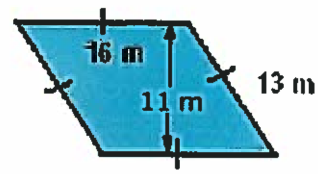
The perimeter of the figure is 14 + 13 + 19 + 19 = 65 cm.

Practice:

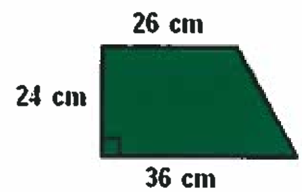
1. Find the area and perimeter of the triangle shown.



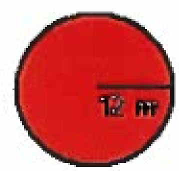
2. Find the area and perimeter of the parallelogram shown.



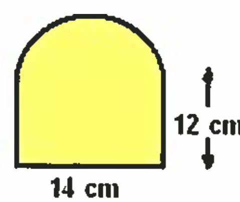
3. Find the area and perimeter of the trapezoid shown.



4. Find the area and perimeter of the circle shown.



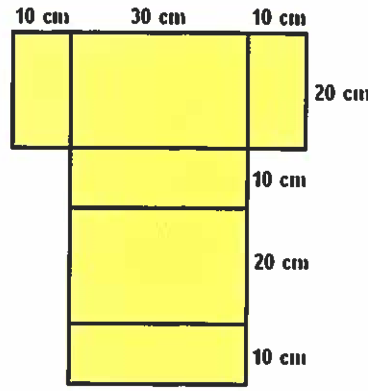
5. Find the area and perimeter of the figure shown.



Answers: 1. 24 cm^2, 24 cm 2. 208 m^2, 58 m 3. 744 cm^2, 112 cm 4. 452 m^2, 75 m 5. 245 cm^2, 60 cm

Get Ready for Grade 9 Surface Area and Volume Worked Examples and Practice

Example 1: A cereal box measures 30 cm by 20 cm by 10 cm. Show a net that can be used to make the box.



Solution: Several nets are possible. One of them is shown.

Example 2: Find the surface area of the box in Example 1.

Solution: Use the formula for the surface area of a box, or rectangular prism. The length is 30 cm, the width is 20 cm, and the height is 10 cm.

$$\begin{aligned} S &= 2lw + 2wh + 2lh \\ &= 2(30 \times 20) + 2(20 \times 10) + 2(30 \times 10) \\ &= 2200 \text{ cm}^2 \end{aligned}$$

The surface area is 2200 cm^2.

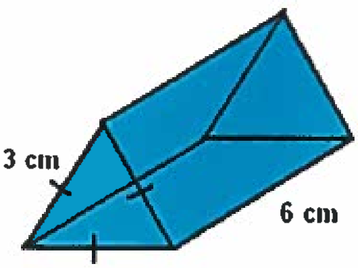
Example 3: Find the volume of the box in Example 1.

Solution: Use the formula for the volume of a box.

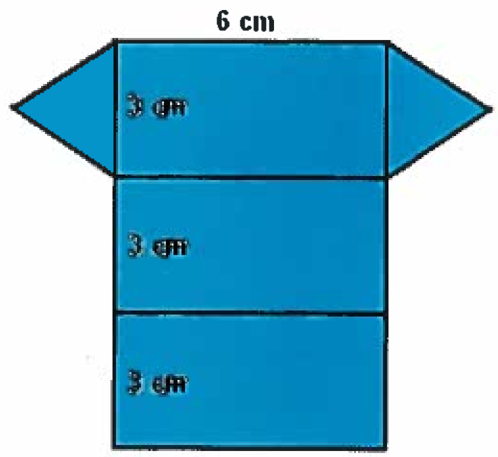
$$\begin{aligned} V &= lwh \\ &= 30 \times 20 \times 10 \\ &= 6000 \text{ cm}^3 \end{aligned}$$

The volume is 6000 cm^3.

Example 4: A triangular prism for use in a camera is shown. Draw a net that can be used to make a model of the prism.

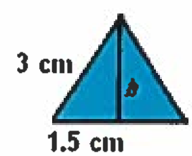


Solution: Several nets are possible. One of them is shown.



Example 5: Find the surface area and volume of the triangular prism in Example 4.

Solution: You will need to calculate the area of the triangular end of the prism. Use the Pythagorean theorem to find the height.



$$\begin{aligned} h^2 &= 3^2 - 1.5^2 \\ &= 6.75 \\ h &= 2.6 \text{ cm} \end{aligned}$$

The area of the triangle is calculated:

$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2} \times (3) \times (2.6) \\ &= 3.9 \text{ cm}^2 \end{aligned}$$

The surface area of the prism is twice the area of the triangle plus three times the area of one side.

$$\begin{aligned} S &= 2 \times (3.9) + 3 \times (3) \times (6) \\ &= 61.8 \text{ cm}^2 \end{aligned}$$

The surface area is 61.8 cm^2.

The volume of the prism is given by the area of the triangle multiplied by the length.

$$\begin{aligned} V &= 3.9 \times 6 \\ &= 23.4 \text{ cm}^3 \end{aligned}$$

The volume is 23.4 cm^3.

Practice:

1. A sand box measures 1.5 m by 1.8 m by 0.25 m. Sketch a net to represent the sand box.

2. Find the surface area and volume of the sand box in question 1.

3. A triangular prism is shown. Sketch a net to represent the prism.

4. Find the surface area and volume of the prism in question 3.

Answers:

2. $S = 7.05\ m^2$, $V = 0.675\ m^3$

4. $S = 920\ cm^2$, $V = 1200\ cm^3$