Multiply your Knowledge by Adding Meaning to Mathematics

Examples

1. Why is ***division by zero undefined***?

$$100 \div 20$$

MEANS

"How many groups of 20 can be formed from 100 objects?

Since 5 groups of 20 can be formed, the answer is 5.

$$100 \div \frac{1}{2}$$

MEANS

"How many groups of $\frac{1}{2}$ can be formed from 100 objects?

Since 200 groups of $\frac{1}{2}$ can be formed, the answer is 200.

$$100 \div 0$$

MEANS

"How many groups of 0 can be formed from 100 objects?

Any number of groups of zero will always add up to zero! Clearly then, it is ***impossible*** to make 100, or any other value for that matter, from groups of zero! Thus, we say that division by zero is ***undefined***.

LANGUAGE HAS MEANING!

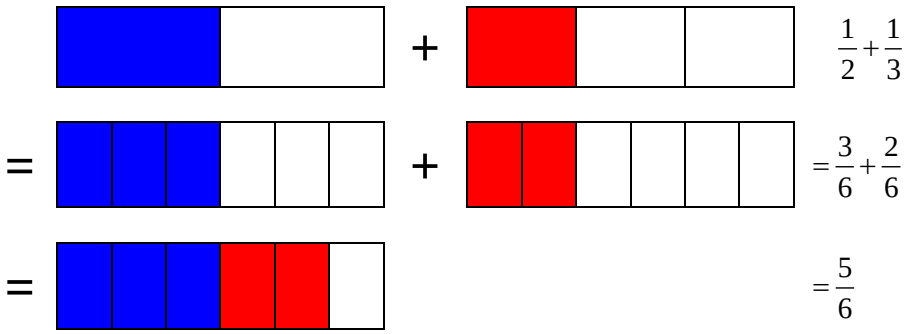
↓

MATH IS A LANGUAGE!

↓

THEREFORE, MATH HAS MEANING!

2. Explain why $\frac{1}{2}+\frac{1}{3}$ ***cannot possibly be equal to*** $\frac{2}{5}$.



$\frac{1}{2}+\frac{1}{3}$

$=\frac{3}{6}+\frac{2}{6}$

$=\frac{5}{6}$

The diagrams at the right clearly show that $\frac{1}{2}+\frac{1}{3}$ must equal $\frac{5}{6}$! Even without the diagrams, we could ***reason*** that $\frac{1}{2}+\frac{1}{3}$ must be ***greater than*** $\frac{1}{2}$ but $\frac{2}{5}$ is obviously ***less than*** $\frac{1}{2}$!

Definition of "Undefined"

Whenever mathematicians ***cannot find a way to give a meaning*** to a mathematical term, operation or other mathematical concept, they say that it is ***undefined***.

Exercises

Complete the following table.

Mathematical Expression	***Meaning***	***Picture***	***Evaluate the Expression***
$-3+5$			
$-3+1$			
$-3-5$			
$-3-(-5)$			
$-3+(-5)$			
$-3-(+5)$			
$\frac{7}{5}-\frac{3}{10}$			
$\frac{7}{15}-\frac{3}{10}$			
$10\div 0.1$			
$10\div 0$			

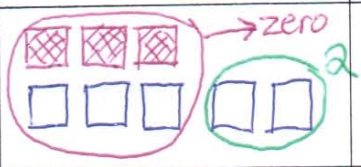
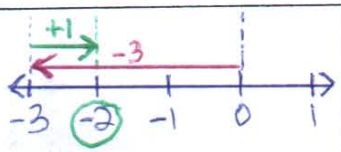
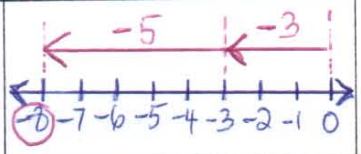
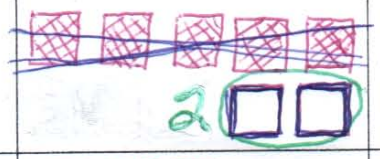
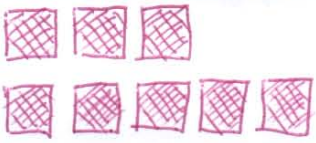
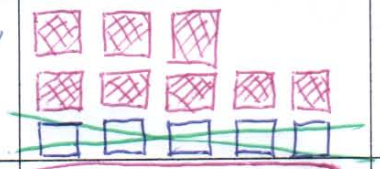
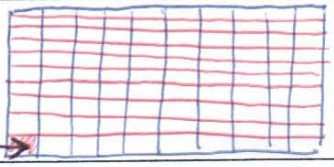
Solutions

□ = 1

▨ = -1

Exercises

Complete the following table.

Mathematical Expression	*Meaning*	*Picture*	*Evaluate the Expression*
$-3+5$	loss of 3 followed by a gain of 5		$-3+5$ $=2$ ✓
$-3+1$	loss of 3 followed by a gain of 1		$-3+1$ $=-2$ ✓
$-3-5$	loss of 3 followed by a loss of 5		$-3-5$ $=-8$ ✓
gain $-3-(-5)$	loss of 3 followed by a gain of 5		$-3-(-5)$ $=-3+5$ ✓ $=2$ ✓
loss $-3+(-5)$	loss of 3 followed by a loss of 5		$-3+(-5)$ $=-3-5$ ✓ $=-8$ ✓
loss $-3-(+5)$	loss of 3 followed by a loss of 5		$-3-(+5)$ $=-3-5$ ✓ $=-8$ ✓
$\frac{7}{5}-\frac{3}{10}$	three-tenths of a whole is taken away from one whole plus two-fifths of a whole		$\frac{7}{5}\overset{\times 2}{=}\frac{3}{10}$ ✓ $=\frac{14}{10}-\frac{3}{10}=\frac{11}{10}$ ✓
$\frac{7}{15}-\frac{3}{10}$	three-tenths of a whole is subtracted from seven-fifteenths of a whole	Similar to previous one	$\frac{7\times 2}{15\times 2}-\frac{3\times 3}{10\times 3}$ ✓ $=\frac{14}{30}-\frac{9}{30}=\frac{5}{30}=\frac{1}{6}$ ✓
$10\div 0.1$	How many groups of 0.1 can be made from 10? 100		$10\div 0.1$ $=100$ ✓
$10\div 0$	How many groups of zero can be made from 10?	No picture can be drawn because 10 cannot be divided up into groups of zero	$10\div 0$ is undefined ✓

Kuta Software - Infinite Algebra 1 Name_____

Order of Operations

Date_____ Period____

1 2 3 4
B E DM AS
Division/Multiplication - tied, left-to-right
Addition/Subtraction - tied, left-to-right

Evaluate each expression.

Terms are separated by + and - signs.

Separate each expression into terms. Then apply the operations in the correct order.

1) $3(6+7)$

2) $5 \times 3 \times 2$

3) $72 \div 9 + 7$

4) $2 + 7 \times 5$

5) $9 + 8 - 7$

6) $9 - 32 \div 4$

7) $5(10-1)$

8) $48 \div (4+4)$

9) $20 \div (4 - (10-8))$

10) $40 \div 4 - (5-3)$

11) $9 + 9 + 6 - 5$

12) $(5+16) \div 7 - 2$

13) $7 + 10 \times 5 + 10$

14) $(6 + 25 - 7) \div 6$

15) $(6-4) \times 49 \div 7$

16) $(7 \times 5) \div 5$

17) $\frac{43-1}{4+2} + 10$

18) $(8+5) \times \frac{35}{5} + 6$

19) $\frac{27}{2+3+4} + 3$

20) $\frac{45}{8(5-4)-3}$

21) $8 \times \frac{15}{5} - (5+9)$

22) $2 \times 7 - \frac{10}{9-4}$

23) $(10 + 2 - 2) \times 6 - 1$

24) $\frac{49}{7} \times \frac{60}{2 \times 5}$

25) $(2 + 6 \times 2 + 2 - 4) \times 2$

26) $\frac{8}{5-1} \times (3+6) \times 3$

Name_____

Order of Operations

Date_____ Period____

Evaluate each expression.

1) $3(6 + 7)$

39

2) $5 \times 3 \times 2$

30

3) $72 \div 9 + 7$

15

4) $2 + 7 \times 5$

37

5) $9 + 8 - 7$

10

6) $9 - 32 \div 4$

1

7) $5(10 - 1)$

45

8) $48 \div (4 + 4)$

6

9) $20 \div (4 - (10 - 8))$

10

10) $40 \div 4 - (5 - 3)$

8

11) $9 + 9 + 6 - 5$

19

12) $(5 + 16) \div 7 - 2$

1

13) $7 + 10 \times 5 + 10$

67

14) $(6 + 25 - 7) \div 6$

4

15) $(6 - 4) \times 49 \div 7$

14

16) $(7 \times 5) \div 5$

7

17) $\frac{43 - 1}{4 + 2} + 10$

17

18) $(8 + 5) \times \frac{35}{5} + 6$

97

19) $\frac{27}{2 + 3 + 4} + 3$

6

20) $\frac{45}{8(5 - 4) - 3}$

9

21) $8 \times \frac{15}{5} - (5 + 9)$

10

22) $2 \times 7 - \frac{10}{9 - 4}$

12

23) $(10 + 2 - 2) \times 6 - 1$

59

24) $\frac{49}{7} \times \frac{60}{2 \times 5}$

42

25) $(2 + 6 \times 2 + 2 - 4) \times 2$

24

26) $\frac{8}{5 - 1} \times (3 + 6) \times 3$

54

 Name_____

Adding Positive and Negative Numbers

Date_____ Period____

Find each sum.

1) $(-7) + 9$

2) $(-8) + (-1)$

3) $(-1) + 5$

4) $(-6) + 12$

5) $(-8) + (-5)$

6) $11 + (-2)$

7) $49 + (-15)$

8) $(-47) + 30$

9) $49 + (-27)$

10) $(-29) + 9$

11) $43 + (-1)$

12) $10 + (-2) + 1$

13) $(-2) + 11 + 4$

14) $12 + 7 + (-4)$

15) $(-7) + 3 + 9$

16) $(-1) + 11 + 5$

17) $2 + 10 + (-10) + 10$

18) $10 + (-11) + 5 + (-5)$

19) $2 + 6 + (-7) + 10$

20) $(-5) + (-8) + (-2) + 1$

21) $(-6.8) + (-1.9)$

22) $2.489 + (-4.3)$

23) $(-4.7) + 5.7$

24) $(-5) + (-7.1)$

25) $(-3.9) + 7.1 + (-7.8)$

26) $(-4.5) + 4.9 + 3.4$

27) $(-2.1) + (-1) + (-7.6)$

28) $0.85 + (-2.4) + 4.5$

29) $\frac{5}{3} + \left(-\frac{7}{5}\right)$

30) $\frac{8}{5} + \left(-\frac{1}{3}\right)$

31) $\left(-\frac{1}{3}\right) + \left(-\frac{3}{5}\right)$

32) $\frac{1}{2} + \left(-\frac{5}{3}\right)$

33) $2 + \left(-\frac{1}{4}\right)$

34) $\left(-\frac{1}{4}\right) + \left(-\frac{3}{2}\right)$

 Name_____

Adding Positive and Negative Numbers

Date_____ Period____

Find each sum.

1) $(-7) + 9$
2

2) $(-8) + (-1)$
-9

3) $(-1) + 5$
4

4) $(-6) + 12$
6

5) $(-8) + (-5)$
-13

6) $11 + (-2)$
9

7) $49 + (-15)$
34

8) $(-47) + 30$
-17

9) $49 + (-27)$
22

10) $(-29) + 9$
-20

11) $43 + (-1)$
42

12) $10 + (-2) + 1$
9

13) $(-2) + 11 + 4$
13

14) $12 + 7 + (-4)$
15

15) $(-7) + 3 + 9$
5

16) $(-1) + 11 + 5$
15

17) $2 + 10 + (-10) + 10$
12

18) $10 + (-11) + 5 + (-5)$
-1

19) $2 + 6 + (-7) + 10$
11

20) $(-5) + (-8) + (-2) + 1$
-14

21) $(-6.8) + (-1.9)$
-8.7

22) $2.489 + (-4.3)$
-1.811

23) $(-4.7) + 5.7$
1

24) $(-5) + (-7.1)$
-12.1

25) $(-3.9) + 7.1 + (-7.8)$
-4.6

26) $(-4.5) + 4.9 + 3.4$
3.8

27) $(-2.1) + (-1) + (-7.6)$
-10.7

28) $0.85 + (-2.4) + 4.5$
2.95

29) $\frac{5}{3} + \left(-\frac{7}{5}\right)$ $\frac{4}{15}$

30) $\frac{8}{5} + \left(-\frac{1}{3}\right)$ $\frac{19}{15}$

31) $\left(-\frac{1}{3}\right) + \left(-\frac{3}{5}\right)$ $-\frac{14}{15}$

32) $\frac{1}{2} + \left(-\frac{5}{3}\right)$ $-\frac{7}{6}$

33) $2 + \left(-\frac{1}{4}\right)$ $\frac{7}{4}$

34) $\left(-\frac{1}{4}\right) + \left(-\frac{3}{2}\right)$ $-\frac{7}{4}$

 Name_____

Adding and Subtracting Positive and Negative Numbers Date_____ Period____

Evaluate each

+(+) add a positive: GAIN
-(-) subtract a negative: GAIN

+(-) add a negative: LOSS
-(+) subtract a positive: LOSS

Gains more than losses: + answer
Losses more than gains: - answer

1) $(-2) + 3$

2) $(-14) + (-7)$

3) $3 - (-8)$

4) $(-9) + 14$

5) $(-8) - (-2)$

6) $5 + (-8)$

7) $(-27) - 24$

8) $(-41) + (-40)$

9) $38 - (-17)$

10) $(-44) + (-9)$

11) $(-16) - (-36)$

12) $(-6) - 24$

13) $(-16) - 6 + (-5)$

14) $15 - 13 + 2$

15) $16 - (-13) - (-5)$

16) $(-7) - (-2) - 9$

17) $(-11) - (-14) + 7$

18) $7 + (-1) + 12 - 7$

19) $6 + (-7) + (-5) - (-2)$

20) $(-3) + 5 + (-5) + 12$

21) $(-11) - 8 + 1 - (-6)$

22) $10 - (-10) - 7 - 5$

23) $6 - 3.98$

24) $5.8 + (-2.5)$

25) $1.8 - (-3.7)$

26) $7 - 2.8$

27) $(-0.8) + (-7.2) - 5.4$

28) $1.7 - (-0.8) + 4.013$

29) $\left(-\frac{3}{2}\right) + \frac{8}{5}$

30) $\frac{7}{4} - \left(-\frac{1}{2}\right)$

31) $\left(-\frac{1}{5}\right) + \frac{7}{4}$

32) $\frac{2}{5} - \frac{4}{5}$

 Name_____

Adding and Subtracting Positive and Negative Numbers Date_____ Period____

Evaluate each expression.

1) $(-2) + 3$
1

2) $(-14) + (-7)$
-21

3) $3 - (-8)$
11

4) $(-9) + 14$
5

5) $(-8) - (-2)$
-6

6) $5 + (-8)$
-3

7) $(-27) - 24$
-51

8) $(-41) + (-40)$
-81

9) $38 - (-17)$
55

10) $(-44) + (-9)$
-53

11) $(-16) - (-36)$
20

12) $(-6) - 24$
-30

13) $(-16) - 6 + (-5)$
-27

14) $15 - 13 + 2$
4

15) $16 - (-13) - (-5)$
34

16) $(-7) - (-2) - 9$
-14

17) $(-11) - (-14) + 7$
10

18) $7 + (-1) + 12 - 7$
11

19) $6 + (-7) + (-5) - (-2)$
-4

20) $(-3) + 5 + (-5) + 12$
9

21) $(-11) - 8 + 1 - (-6)$
-12

22) $10 - (-10) - 7 - 5$
8

23) $6 - 3.98$
2.02

24) $5.8 + (-2.5)$
3.3

25) $1.8 - (-3.7)$
5.5

26) $7 - 2.8$
4.2

27) $(-0.8) + (-7.2) - 5.4$
-13.4

28) $1.7 - (-0.8) + 4.013$
6.513

29) $\left(-\frac{3}{2}\right) + \frac{8}{5}$ $\frac{1}{10}$

30) $\frac{7}{4} - \left(-\frac{1}{2}\right)$ $\frac{9}{4}$

31) $\left(-\frac{1}{5}\right) + \frac{7}{4}$ $\frac{31}{20}$

32) $\frac{2}{5} - \frac{4}{5}$ $-\frac{2}{5}$

 Name_____

Multiplying and Dividing Positives and Negatives

Date_____ Period____

Find each quotient.

Rule for Determining the Sign of the Answer when Multiplying and Dividing

Two Numbers
Signs Same: + answer
Signs Different: - answer

More than Two Numbers
Even # of Negatives: + answer
Odd # of Negatives: - answer

1) $\frac{10}{5}$

2) $\frac{-24}{12}$

3) $\frac{-20}{-2}$

4) $\frac{-300}{-20}$

5) $\frac{65}{5}$

6) $\frac{-66}{-6}$

7) $\frac{75}{-15}$

8) $\frac{-56}{-14}$

9) $\frac{102}{-17}$

10) $\frac{-72}{-4}$

11) $153 \div 17$

12) $12 \div -3$

13) $48 \div 6$

14) $-120 \div -20$

15) $306 \div 18$

16) $-65 \div 13$

17) $-85 \div -17$

18) $128 \div -16$

19) $-180 \div 15$

20) $234 \div -13$

Find each product.

21) -11×9

22) -7×-12

23) -8×-11

24) -6×4

25) -3×-11

26) -5×-9

27) 9×-7

28) -9×-3

29) 12×-12

30) 11×-6

31) $6 \times -5 \times 3$

32) $6 \times -1 \times 2$

33) $8 \times -6 \times -3$

34) $-3 \times 6 \times -6$

35) $(3)(3)(-1)(3)$

36) $(-3)(3)(-3)(-3)$

Kuta Software - Infinite Algebra 1 Name_____

Multiplying and Dividing Positives and Negatives

Date_____ Period____

Find each quotient.

1) $\frac{10}{5}$ 2

2) $\frac{-24}{12}$ −2

3) $\frac{-20}{-2}$ 10

4) $\frac{-300}{-20}$ 15

5) $\frac{65}{5}$ 13

6) $\frac{-66}{-6}$ 11

7) $\frac{75}{-15}$ −5

8) $\frac{-56}{-14}$ 4

9) $\frac{102}{-17}$ −6

10) $\frac{-72}{-4}$ 18

11) $153 \div 17$ 9

12) $12 \div -3$ −4

13) $48 \div 6$ 8

14) $-120 \div -20$ 6

15) $306 \div 18$ 17

16) $-65 \div 13$ −5

17) $-85 \div -17$ 5

18) $128 \div -16$ −8

19) $-180 \div 15$ −12

20) $234 \div -13$ −18

Find each product.

21) -11×9 −99

22) -7×-12 84

23) -8×-11 88

24) -6×4 −24

25) -3×-11 33

26) -5×-9 45

27) 9×-7 −63

28) -9×-3 27

29) 12×-12 −144

30) 11×-6 −66

31) $6 \times -5 \times 3$ −90

32) $6 \times -1 \times 2$ −12

33) $8 \times -6 \times -3$ 144

34) $-3 \times 6 \times -6$ 108

35) $(3)(3)(-1)(3)$ −27

36) $(-3)(3)(-3)(-3)$ −81

Kuta Software - Infinite Algebra 1 Name_____

Percent of Change

Date_____ Period____

Find each percent change to the nearest percent. State if it is an increase or a decrease.

1) From 45 ft to 92 ft

2) From 74 hours to 85 hours

3) From 74 ft to 75 ft

4) From 36 inches to 90 inches

5) From 94 miles to 34 miles

6) From 12 ft to 23 ft

7) From 83 hours to 76 hours

8) From 24 grams to 96 grams

9) From 20 tons to 99 tons

10) From 16 tons to 72 tons

11) From 117 minutes to 91 minutes

12) From 188 m to 42 m

13) From 362 m to 156 m

14) From 139 minutes to 385 minutes

15) From $328 to $333

16) From 259 hours to 274 hours

17) From 284 grams to 206 grams

18) From $246 to $221

19) From 309 grams to 299 grams

20) From 326 ft to 241 ft

21) From 4048 minutes to 7548 minutes

22) From 2150 miles to 7895 miles

23) From 4359 ft to 5377 ft

24) From 5876 m to 6820 m

 Name_____

Percent of Change

Date_____ Period____

Find each percent change to the nearest percent. State if it is an increase or a decrease.

1) From 45 ft to 92 ft

104% increase

2) From 74 hours to 85 hours

15% increase

3) From 74 ft to 75 ft

1% increase

4) From 36 inches to 90 inches

150% increase

5) From 94 miles to 34 miles

64% decrease

6) From 12 ft to 23 ft

92% increase

7) From 83 hours to 76 hours

8% decrease

8) From 24 grams to 96 grams

300% increase

9) From 20 tons to 99 tons

395% increase

10) From 16 tons to 72 tons

350% increase

11) From 117 minutes to 91 minutes

22% decrease

12) From 188 m to 42 m

78% decrease

13) From 362 m to 156 m

57% decrease

14) From 139 minutes to 385 minutes

177% increase

15) From $328 to $333

2% increase

16) From 259 hours to 274 hours

6% increase

17) From 284 grams to 206 grams

27% decrease

18) From $246 to $221

10% decrease

19) From 309 grams to 299 grams

3% decrease

20) From 326 ft to 241 ft

26% decrease

21) From 4048 minutes to 7548 minutes

86% increase

22) From 2150 miles to 7895 miles

267% increase

23) From 4359 ft to 5377 ft

23% increase

24) From 5876 m to 6820 m

16% increase

Name_____

Evaluating Expressions

Date_____ Period____

Evaluate each using the values given.

1) $y \div 2 + x$; use $x = 1$, and $y = 2$

2) $a - 5 - b$; use $a = 10$, and $b = 4$

3) $p^2 + m$; use $m = 1$, and $p = 5$

4) $y + 9 - x$; use $x = 1$, and $y = 3$

5) $m + p \div 5$; use $m = 1$, and $p = 5$

6) $y^2 - x$; use $x = 7$, and $y = 7$

7) $z(x + y)$; use $x = 6$, $y = 8$, and $z = 6$

8) $x + y + y$; use $x = 9$, and $y = 10$

9) $p^3 + 10 + m$; use $m = 9$, and $p = 3$

10) $6q + m - m$; use $m = 8$, and $q = 3$

11) $p^2m \div 4$; use $m = 4$, and $p = 7$

12) $y - \left(z + z^2\right)$; use $y = 10$, and $z = 2$

13) $z - (y \div 3 - 1)$; use $y = 3$, and $z = 7$

14) $(y + x) \div 2 + x$; use $x = 1$, and $y = 1$

15) $p - (9 - (m + q))$; use $m = 4$, $p = 5$, and $q = 3$

16) $(a^2 - b) \div 6$; use $a = 5$, and $b = 1$

17) $2(p + 4) - (m + n)$; use $m = 4$, $n = 2$, and $p = 5$

18) $y - (4 - x - y \div 2)$; use $x = 3$, and $y = 2$

19) $x^3 \div 3 - y$; use $x = 3$, and $y = 1$

20) $pn + (n + m)^2$; use $m = 1$, $n = 4$, and $p = 6$

21) $12k - h^2$; use $h = 2$, and $k = 3$

22) $p + m + n + m^2$; use $m = 4$, $n = 5$, and $p = 5$

23) $2 + r - (5 - q) + p$; use $p = 2$, $q = 2$, and $r = 5$

24) $y - z + xz \div 6$; use $x = 3$, $y = 4$, and $z = 4$

25) $\frac{y}{2} + x + 4 + z + y$; use $x = 7$, $y = 2$, and $z = 4$

26) $c \times \frac{bc}{4} - (7 - a)$; use $a = 4$, $b = 8$, and $c = 5$

Name_____

Evaluating Expressions

Date_____ Period____

Evaluate each using the values given.

1) $y \div 2 + x$; use $x = 1$, and $y = 2$

2

2) $a - 5 - b$; use $a = 10$, and $b = 4$

1

3) $p^2 + m$; use $m = 1$, and $p = 5$

26

4) $y + 9 - x$; use $x = 1$, and $y = 3$

11

5) $m + p \div 5$; use $m = 1$, and $p = 5$

2

6) $y^2 - x$; use $x = 7$, and $y = 7$

42

7) $z(x + y)$; use $x = 6$, $y = 8$, and $z = 6$

84

8) $x + y + y$; use $x = 9$, and $y = 10$

29

9) $p^3 + 10 + m$; use $m = 9$, and $p = 3$

46

10) $6q + m - m$; use $m = 8$, and $q = 3$

18

11) $p^2m \div 4$; use $m = 4$, and $p = 7$

49

12) $y - \left(z + z^2\right)$; use $y = 10$, and $z = 2$

4

13) $z - (y \div 3 - 1)$; use $y = 3$, and $z = 7$

7

14) $(y + x) \div 2 + x$; use $x = 1$, and $y = 1$

2

15) $p - (9 - (m + q))$; use $m = 4$, $p = 5$, and $q = 3$

3

16) $(a^2 - b) \div 6$; use $a = 5$, and $b = 1$

4

17) $2(p + 4) - (m + n)$; use $m = 4$, $n = 2$, and $p = 5$

12

18) $y - (4 - x - y \div 2)$; use $x = 3$, and $y = 2$

2

19) $x^3 \div 3 - y$; use $x = 3$, and $y = 1$

8

20) $pn + (n + m)^2$; use $m = 1$, $n = 4$, and $p = 6$

49

21) $12k - h^2$; use $h = 2$, and $k = 3$

32

22) $p + m + n + m^2$; use $m = 4$, $n = 5$, and $p = 5$

30

23) $2 + r - (5 - q) + p$; use $p = 2$, $q = 2$, and $r = 5$

6

24) $y - z + xz \div 6$; use $x = 3$, $y = 4$, and $z = 4$

2

25) $\frac{y}{2} + x + 4 + z + y$; use $x = 7$, $y = 2$, and $z = 4$

18

26) $c \times \frac{bc}{4} - (7 - a)$; use $a = 4$, $b = 8$, and $c = 5$

47

Kuta Software - Infinite Algebra 1

add: sum, plus, increased by, more than, greater than, total of
subtract: difference, minus, decreased by, less than
multiply: product, times, of, double (x2), twice (x2), triple (x3)
divide: quotient, ratio of

Variable and Verbal Expressions

Write each as an algebraic expression.

1) the difference of 10 and 5

2) the quotient of 14 and 7

3) u decreased by 17

4) half of 14

5) x increased by 6

6) the product of x and 7

7) the sum of q and 8

8) 6 squared

9) twice q

10) the product of 8 and 12

11) the quotient of 18 and n

12) n cubed

Write each as a verbal expression.

13) $\frac{x}{2}$

14) $a + 9$

15) $19 - 3$

16) $5n$

17) q^2

18) $\frac{40}{5}$

19) $\frac{a}{8}$

20) $x + 8$

21) $n - 14$

22) 2^2

23) $\frac{60}{5}$

24) $n \cdot 6$

Evaluate each expression.

25) 5 squared

26) the product of 8 and 10

27) 20 decreased by 17

28) the quotient of 96 and 8

29) twice 6

30) 10 less than 17

31) 9 times 5

32) 10 increased by 8

33) 7 squared

34) the product of 4 and 5

Name_____

Variable and Verbal Expressions

Date_____ Period____

Write each as an algebraic expression.

1) the difference of 10 and 5
$10 - 5$

2) the quotient of 14 and 7
$\frac{14}{7}$

3) u decreased by 17
$u - 17$

4) half of 14
$\frac{14}{2}$

5) x increased by 6
$x + 6$

6) the product of x and 7
$x \cdot 7$

7) the sum of q and 8
$q + 8$

8) 6 squared
6^2

9) twice q
$2q$

10) the product of 8 and 12
$8 \cdot 12$

11) the quotient of 18 and n
$\frac{18}{n}$

12) n cubed
n^3

Write each as a verbal expression.

13) $\frac{x}{2}$
half of x

14) $a + 9$
a increased by 9

15) $19 - 3$
the difference of 19 and 3

16) $5n$
5 times a number

17) q^2
q squared

18) $\frac{40}{5}$
40 divided by 5

19) $\frac{a}{8}$
a divided by 8

20) $x + 8$
x plus 8

21) $n - 14$
a number minus 14

22) 2^2
2 squared

23) $\frac{60}{5}$
the quotient of 60 and 5

24) $n \cdot 6$
a number times 6

Evaluate each expression.

25) 5 squared
25

26) the product of 8 and 10
80

27) 20 decreased by 17
3

28) the quotient of 96 and 8
12

29) twice 6
12

30) 10 less than 17
7

31) 9 times 5
45

32) 10 increased by 8
18

33) 7 squared
49

34) the product of 4 and 5
20

MENTAL MATH PRE-TEST

Let's see how you do WITHOUT a calculator !!

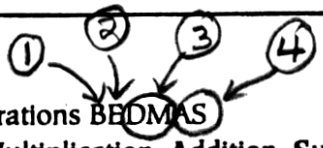
1.	21 - 6 + 18	
2.	555 - 121	
3.	101 + 765	
4.	12 x 4	
5.	56 ÷ 8	
6.	6 x 5 ÷ 2	
7.	0 x 4 ÷ 7	
8.	21 x 10	
9.	500 ÷20	
10.	$(18 - 15)^4$	
11.	- 4 + 18	
12.	16 - 29	
13.	(40 + 24) - 8 ÷ 2 + 1	
14.	(-2) (- 7)	
15.	(- 15) ÷ (- 3)	
16.	0.5 as a fraction	
17.	0.45 as a fraction in lowest terms	
18.	3 % as a fraction	
19.	0.05 as a percent	
20.	$\frac{28}{50}$ as a percent	
21.	$\frac{3}{4}$ as a decimal	
22.	130 % as a decimal	

23.	Change $4\frac{1}{7}$ to an improper fraction.	
24.	Change $\frac{13}{5}$ to a mixed fraction.	
25.	$2\frac{1}{2} + 3\frac{1}{2}$	
26.	$\frac{2}{7} + \frac{5}{14}$	
27.	$\frac{9}{10} - \frac{7}{10}$	
28.	$1 - \frac{2}{3}$	
29.	$\frac{1}{5} * \frac{4}{6}$	
30.	$\frac{5}{6} \div \frac{2}{3}$	
31.	2x + 7x	
32.	$\sqrt{25}$	
33.	15% of $ 3. 00	
34.	area of a rectangle that has width 6cm and length 9 cm	
35.	perimeter of a rectangle that has width 6cm and length 9 cm	

NAME: _____

/35

Name



Order of operations

Remember to use the order of operations BEDMAS
(Brackets, Exponents, Division, Multiplication, Addition, Subtraction)
to evaluate expressions.

1. $3 \times 8 - 4 + 6 \times 1 \div (4 - 2)$
   $= 3 \times 8 - 4 + 6 \times 1 + 2$
   $= 24 - 4 + 3$
   $= 23$

2. $8 + 5 \times 2$ ____

3. $6 \times 5 - 2 \times 3$ ____

4. $7 \times 5 - 3 \times 4 + 9$ ____

5. $12 \times 3 + 4 \times 9 - 15$ ____

6. $7 \times 6 - 15 \div 3$ ____

7. $8 - 4 \div 2$ ____

8. $8 \times 3 \div (10 + 2)$ ____

9. $4 \times 16 \div 2 - 10 + 4$ ____

10. $29 - 16 \div 4 + 8$ ____

11. $8 \times 5 - 21 \div 3 + 7$ ____

12. $36 \div (15 + 3 - 9)$ ____

13. $3 + 4 \times (3 + 2)$ ____

14. $8 - 3 \times (5 - 4)$ ____

15. $11 - 12 \div 4 + 2 \times (7 - 2)$ ____

16. $\dfrac{3(6-4)+15}{8-1}$ ____

17. $15 \div (3 + 2) + 7 \times 4 - 8 \times 3$ ____

18. $14 - 8 \div 4 + 0 \times (5 - 3)$ ____

19. $25 + 3 \times 4 - 8 \div 2$ ____

20. $\dfrac{7 \times 5 - (3 + 2)}{(20 \div 2 \times 3) \div 2}$ ____

Name

Adding integers

Evaluate each of the following.

1. $(+15) + (-7) + (+1)$

   $= 15 - 7 + 1$
   $= 9$

2. $(+9) + (-7)$ ____

3. $(-14) + (+6)$ ____

4. $(-8) + (-9)$ ____

5. $(-5) + (-6) + (+4)$ ____

6. $(-7) + (+9) + (+5)$ ____

7. $(-5) + (+4) + (-8)$ ____

8. $(+12) + (-11) + (-4)$ ____

9. $(-12) + (-7) + (+12)$ ____

10. $(-14) + (+7) + (-8) + (-4)$ ____

11. $14 + (-9) + 10$ ____

12. $-4 + (-12) + 15$ ____

13. $12 + (-5) + (-7)$ ____

14. $-9 + (-23) + 14 + 5$ ____

15. $-5 + 6 + 13 + (-9)$ ____

16. $13 + (-17) + 3 + (-9)$ ____

17. $-8 + 5 + (-5) + 12$ ____

18. $-15 + (-12) + (-3) + 9 + 25$ ____

19. $-7 + 9 + 12 + (-18) + (-20)$ ____

20. $-9 + (-18) + 7 + (-15) + 12 + 9$ ____

Name

Subtracting integers

Evaluate each of the following.

1. $8 - (-3) - (+5)$

   $= 8 + 3 - 5$

   $= 6$

2. $9 - (+4)$ ____

3. $-4 - (-7)$ ____

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

5. $15 - (-17)$ ____

6. $-3 - (-5)$ ____

7. $-9 - (7)$ ____

8. $-8 - (-11)$ ____

9. $-5 - (-12)$ ____

10. $25 - (-35)$ ____

11. $0 - (-7)$ ____

12. $0 - (-12)$ ____

13. $(+8) - (+14) + (-2)$ ____

14. $(-6) - (-5) - (8)$ ____

15. $(+7) + (-9) - (-6)$ ____

16 $-3 - (-4) + (+12)$ ____

17. $6 - (-7) - (-8)$ ____

18 $-5 + 8 - (-12)$ ____

19. $(-2) + (-7) - (-9) + (-5)$ ____

20 $-7 - (-12) - (5) + (-3)$ ____

Name

Multiplying integers

Evaluate each of the following.

1. $4(6)(-2)(-1)$
   $= 4(6)(2)$
   $= 48$

2. $7(12)$ ____

3. $5(-3)$ ____

4. $5(16)$ ____

5. $-4(2)$ ____

6. $10(-7)$ ____

7. $-6(-10)$ ____

8. $-5(-7)$ ____

9. $-8(-8)$ ____

10. $-5(15)$ ____

11. $-8(-20)$ ____

12. $16(-5)$ ____

13. $-17(-4)$ ____

14. $12(-9)$ ____

15. $-15(20)$ ____

16. $8(-5)(-3)$ ____

17. $4(-3)(-2)$ ____

18. $-6(30)(-4)$ ____

19. $-5(-3)(-5)$ ____

20. $(-7)(-2)(-4)$ ____

Name

Dividing integers

Evaluate each of the following.

1. $-12 \div (-6)$
   $= 12 \div 6$
   $= 2$

2. $25 \div 5 =$ ____

3. $18 \div 3$ ____

4. $27 \div 9$ ____

5. $24 \div (-8)$ ____

6. $(-63) \div 9$ ____

7. $(-54) \div (-6)$ ____

8. $16 \div (-2)$ ____

9. $(-96) \div (-8)$ ____

10. $(-35) \div (5)$ ____

11. $-48 \div (12)$ ____

12. $-28 \div (-7)$ ____

13. $-40 \div 8$ ____

14. $144 \div (-12)$ ____

15. $-81 \div (-9)$ ____

16. $-120 \div 10$ ____

17. $\frac{-36}{9}$ ____

18. $\frac{24}{-4}$ ____

19. $\frac{54}{-6}$ ____

20. $\frac{-20}{5}$ ____

Name

Evaluating expressions

Remember to use BEDMAS —
Brackets, **E**xponents, **D**ivision and **M**ultiplication (in order)
then **A**ddition and **S**ubtraction (in order).

1. $8 + (-2)(-5) \div [4 - (-1)] - 4(-2 + 3)$
   $= 8 + 10 \div [5] - 4(1)$
   $= 8 + 2 - 4$
   $= 6$

2. $12 + 15 \div (-3)$ ____

3. $-6 + (-14) \div (-7)$ ____

4. $-18 - (9)(3)$ ____

5. $30 \div (-2) - (-3)(4)$ ____

6. $-7 - (-3)(-5)$ ____

7. $(-7 + 19) \div 4$ ____

8. $64 - 7 \times (8 - 2)$ ____

9. $8 + 3 \times (2 - 5)$ ____

10. $-5 - 6 \times (4 - 9)$ ____

11. $[-17 - (-4)] \times [-6 - 4]$ ____

12. $(-8)(3) + 12 \div (-6)$ ____

13. $(-14 + 3 - 7) \div [-10 - (-4)]$ ____

14. $-6 \times (3 - 12) - 4 \times (-1 + 6)$ ____

15. $15 - 24 \div (-6) + 5(-7)$ ____

16. $27 \div [(-3)(3)] - 4(-3 - 1)$ ____

17. $\left(\frac{28}{4}\right) + \left(\frac{-14}{2}\right)$ ____

18. $\left(\frac{81}{-9}\right) - \left(\frac{-28}{-7}\right)$ ____

19. $\left(\frac{26}{-13}\right) - \left(\frac{-15}{-3}\right)$ ____

20. $\frac{-16 - 11 - 27 \div 9}{(5 - 7)(-4 - 1)}$ ____

Multiply and Divide Fractions

To multiply fractions, divide the numerator and the denominator by any common factors. Any mixed numbers should first be converted to improper fractions. To divide by a fraction, multiply by its **reciprocal**.

Example 1: Multiply Fractions

Multiply.

a) $\frac{8}{9}\times\frac{3}{4}$ **b)** $1\frac{2}{3}\times1\frac{1}{4}$

Solution

a) $\frac{8}{9}\times\frac{3}{4}=\frac{\overset{2}{\cancel{8}}}{\underset{3}{\cancel{9}}}\times\frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{4}}}$

$=\frac{2}{3}\times\frac{1}{1}$

$=\frac{2}{3}$

b) $1\frac{2}{3}\times1\frac{1}{4}=\frac{5}{3}\times\frac{5}{4}$

$=\frac{25}{12}$

$=2\frac{1}{12}$

Example 2: Divide Fractions

Divide.

a) $\frac{2}{5}\div\frac{4}{9}$ **b)** $3\frac{1}{2}\div\frac{6}{7}$

Solution

a) $\frac{2}{5}\div\frac{4}{9}=\frac{\overset{1}{\cancel{2}}}{5}\times\frac{9}{\underset{2}{\cancel{4}}}$

$=\frac{1}{5}\times\frac{9}{2}$

$=\frac{9}{10}$

b) $3\frac{1}{2}\div\frac{6}{7}=\frac{7}{2}\div\frac{6}{7}$

$=\frac{7}{2}\times\frac{7}{6}$

$=\frac{49}{12}$

$=4\frac{1}{12}$

Practise

*Express your answers in **lowest terms**.*

1. Multiply.

a) $\frac{3}{5}\times\frac{6}{7}$

b) $\frac{1}{3}\times\frac{3}{4}$

2. Multiply.

a) $\frac{5}{8}\times\frac{4}{11}$

b) $\frac{2}{7}\times\frac{3}{10}$

3. Multiply.

a) $\frac{1}{3} \times 2\frac{2}{5}$

b) $1\frac{1}{6} \times \frac{3}{7}$

c) $4\frac{1}{5} \times 2\frac{2}{3}$

d) $1\frac{3}{4} \times 2\frac{3}{14}$

4. Divide.

a) $\frac{4}{7} \div \frac{1}{2}$

b) $\frac{4}{9} \div \frac{2}{3}$

c) $\frac{5}{12} \div \frac{3}{10}$

d) $\frac{2}{3} \div \frac{7}{15}$

5. Divide.

a) $1\frac{1}{4} \div \frac{4}{5}$

b) $2\frac{7}{8} \div \frac{3}{4}$

c) $3\frac{1}{5} \div 2\frac{2}{3}$

d) $1\frac{2}{9} \div 7\frac{1}{3}$

6. A jar of jelly beans is $\frac{2}{3}$ full. $\frac{3}{8}$ of these jelly beans are orange. What fraction of the full jar are the orange jelly beans?

7. A bowl of strawberries is $\frac{3}{4}$ full. Janice and her friends had each eaten $\frac{1}{8}$ of a bowl of strawberries. How many people ate strawberries?

Lowest Common Denominator

The lowest common denominator (LCD) is the **lowest common multiple** of the denominators of two or more fractions. You can find the LCD using multiples or prime factors.

Example: LCD of Two Fractions

Find the LCD for $\frac{1}{6}$ and $\frac{1}{8}$.

Solution

Method 1: Use Multiples

List the multiples of 6 and 8 until a common value is reached.

6, 12, 18, **24**

8, 16, **24**

The LCD for $\frac{1}{6}$ and $\frac{1}{8}$ is 24.

Method 2: Use Prime Factors

$6 = 2 \times 3$

$8 = 2 \times 2 \times 2$

The LCD will have all the prime factors of each number.

Start with the factors of the first number. Add any missing factors from the next number.

$LCD = 2 \times 3 \times 2 \times 2$

$= 24$

The LCD is 24.

Practise

1. Use multiples to find the LCD for each pair of fractions.

a) $\frac{1}{2}, \frac{1}{3}$

b) $\frac{1}{4}, \frac{1}{5}$

c) $\frac{1}{3}, \frac{1}{7}$

d) $\frac{1}{8}, \frac{1}{9}$

2. Use prime factors to find the LCD for each pair of fractions.

a) $\frac{1}{4}, \frac{1}{8}$

b) $\frac{1}{6}, \frac{1}{18}$

c) $\frac{1}{8}, \frac{1}{16}$

d) $\frac{1}{9}, \frac{1}{27}$

3. Use multiples to find the LCD for each pair of fractions.

a) $\frac{1}{4}, \frac{1}{6}$

b) $\frac{1}{4}, \frac{1}{10}$

c) $\frac{1}{6}, \frac{1}{10}$

d) $\frac{1}{8}, \frac{1}{20}$

4. Use prime factors to find the LCD for each pair of fractions.

a) $\frac{1}{4}, \frac{1}{14}$

b) $\frac{1}{6}, \frac{1}{15}$

c) $\frac{1}{8}, \frac{1}{10}$

d) $\frac{1}{9}, \frac{1}{12}$

5. Find the LCD for each set of fractions.

a) $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$

b) $\frac{1}{4}, \frac{1}{5}, \frac{1}{10}$

6. Find the LCD for each set of fractions.

a) $\frac{1}{3}, \frac{1}{4}, \frac{1}{6}$

b) $\frac{1}{2}, \frac{1}{5}, \frac{1}{15}$

7. Use the LCD to write equivalent fractions.

a) $\frac{5}{6}, \frac{2}{9}$

b) $\frac{3}{8}, \frac{5}{12}$

c) $\frac{1}{2}, \frac{3}{4}, \frac{1}{6}$

d) $\frac{2}{3}, \frac{1}{6}, \frac{7}{9}$

Add and Subtract Fractions

Fractions can be added or subtracted only if they have the same **denominator**.

For example, $\frac{2}{5}+\frac{1}{5}=\frac{3}{5}$ 

To add or subtract fractions with different denominators, the first step is to find the **lowest common denominator** (LCD).

Example 1: Add Fractions

Find each sum.

a) $\frac{3}{4}+\frac{1}{2}$ **b)** $\frac{3}{8}+\frac{1}{6}$

Solution

a) The LCD for $\frac{3}{4}$ and $\frac{1}{2}$ is 4.

$$\frac{3}{4}+\frac{1}{2}=\frac{3}{4}+\frac{1\times 2}{2\times 2}$$
$$=\frac{3}{4}+\frac{2}{4}$$
$$=\frac{5}{4}$$
$$=1\frac{1}{4}$$

b) The LCD for $\frac{3}{8}$ and $\frac{1}{6}$ is 24.

$$\frac{3}{8}+\frac{1}{6}=\frac{3\times 3}{8\times 3}+\frac{1\times 4}{6\times 4}$$
$$=\frac{9}{24}+\frac{4}{24}$$
$$=\frac{13}{24}$$

Example 2: Subtract Fractions

Find each difference.

a) $\frac{3}{4}-\frac{1}{3}$ **b)** $3\frac{2}{5}-2\frac{1}{4}$

Solution

a) The LCD of $\frac{3}{4}$ and $\frac{1}{3}$ is 12.

$$\frac{3}{4}-\frac{1}{3}=\frac{3\times 3}{4\times 3}-\frac{1\times 4}{3\times 4}$$
$$=\frac{9}{12}-\frac{4}{12}$$
$$=\frac{5}{12}$$

b) First, convert the mixed numbers to improper fractions. Then, use the LCD of 20, and subtract.

$$3\frac{2}{5}-2\frac{1}{4}=\frac{17}{5}-\frac{9}{4}$$
$$=\frac{17\times 4}{5\times 4}-\frac{9\times 5}{4\times 5}$$
$$=\frac{68}{20}-\frac{45}{20}$$
$$=\frac{23}{20} \text{ or } 1\frac{3}{20}$$

Practise

1. Find each sum or difference. Express your answers in **lowest terms**.

a) $\frac{4}{9}+\frac{8}{9}$

b) $\frac{3}{8}+\frac{7}{8}$

c) $\frac{3}{4}-\frac{1}{4}$

d) $\frac{9}{10}-\frac{3}{10}$

2. Find each sum.

a) $\frac{5}{6}+\frac{1}{3}$

b) $\frac{3}{10}+\frac{2}{5}$

c) $\frac{5}{12}+\frac{1}{6}$

3. Find each sum.

a) $\frac{2}{3}+\frac{3}{5}$

b) $\frac{5}{6}+\frac{3}{7}$

c) $\frac{2}{9}+\frac{5}{12}$

4. Find each difference.

a) $\frac{7}{8}-\frac{1}{3}$

b) $\frac{8}{9}-\frac{1}{6}$

c) $\frac{5}{6}-\frac{5}{8}$

5. Find each difference.

a) $3\frac{2}{7}-2\frac{1}{2}$

b) $1\frac{5}{9}-\frac{3}{5}$

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

6. During one week, it rained for $2\frac{1}{2}$ h on Monday, $1\frac{3}{4}$ h on Tuesday, and $2\frac{5}{6}$ h on Wednesday.

a) Find the total period of rainfall for this week.

b) How much longer did rain on Wednesday than on Tuesday?

Substituting into Algebraic Expressions

Substitute and evaluate.

1. $8w - 11$ for $w = 9$	2. $b \div 4 - 6$ for $b = 32$	3. $7v + 34$ for $v = 8$	4. $5k$ for $k = 4$
5. $9e$ for $e = 2$	6. $\frac{d}{6} + 28$ for $d = 36$	7. $2n + 31$ for $n = 6$	8. $6c - 21$ for $c = 4$
9. $4z + 8$ for $z = 8$	10. $8x$ for $x = 2$	11. $5t - 10$ for $t = 7$	12. $f \div 5 + 16$ for $f = 35$
13. $\frac{j}{2} + j$ for $j = 6$	14. $9u$ for $u = 3$	15. $3k + 50$ for $k = 2$	16. $2s$ for $s = 7$
17. $m \div 8 - 2$ for $m = 32$	18. $6t - 24$ for $t = 5$	19. $7g + 41$ for $g = 9$	20. $5y - 7$ for $y = 3$

Solving Equations

Solve each equation.

1. $83 + t = 139$	2. $s + 12 = 70$	3. $91 = q + 19$	4. $104 = 74 + x$
5. $f - 45 = 13$	6. $76 - y = 4$	7. $4 = w - 31$	8. $1 = 55 - z$
9. $95 + c = 123$	10. $162 = 86 + j$	11. $v + 63 = 80$	12. $58 = 35 + r$
13. $63 = 66 - b$	14. $25 = x - 17$	15. $79 - g = 22$	16. $w - 18 = 13$
17. $92 = 18 + e$	18. $58 = p + 20$	19. $77 = 62 + q$	20. $28 + h = 110$
21. $z - 24 = 72$	22. $59 = c - 13$	23. $65 - p = 59$	24. $26 = 81 - j$

Course: MPM 1D0 **Welcome Quiz** **Name:** _____ **/21**

1. Evaluate.

[3] a) $7-13=$ b) $-5+14=$ c) $(-3)\times(4)=$

2. Evaluate.

[3] $2(5-3)\div 4=$

3. Evaluate.

[5] a) $\frac{2}{5}+\frac{3}{5}$ b) $\frac{1}{3}\times\frac{2}{5}$ c) $\frac{3}{7}\div\frac{6}{5}$

4. Find 15% of 65.

[1]

5. Solve for unknown.

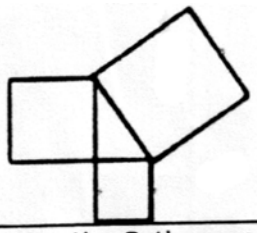
[2] $3x-1=8$

6. Find the **perimeter** and the **area** of a rectangle with dimensions 12mx7m.

[4]

7. Find three consecutive numbers whose sum is 12 and product is 60.

[3]

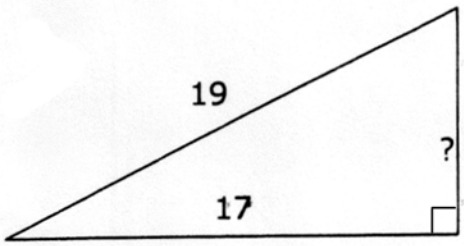


The Pythagorean Theorem

The theorem states that the square of the hypotenuse is the sum of the squares of the legs. Always understand that the Pythagorean Theorem relates the areas of squares on the sides of the right triangle.

Use the Pythagorean Theorem to find the missing length.

1.



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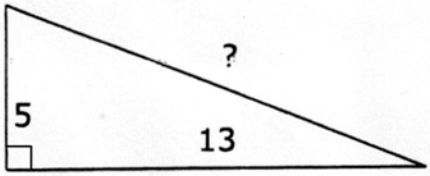

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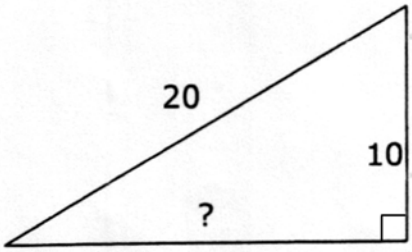

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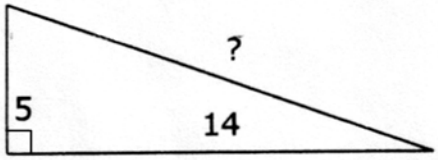

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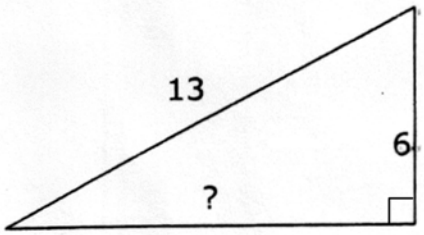

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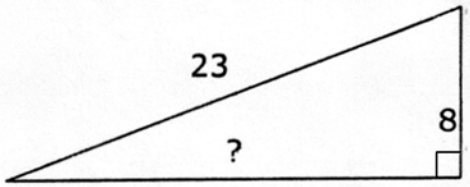

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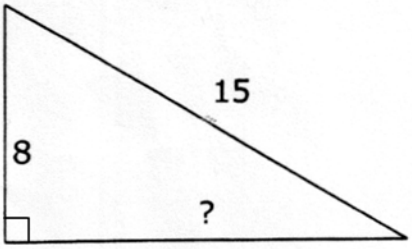

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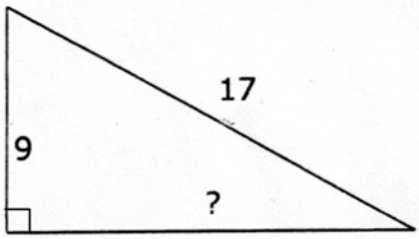

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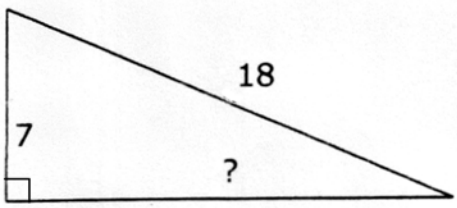

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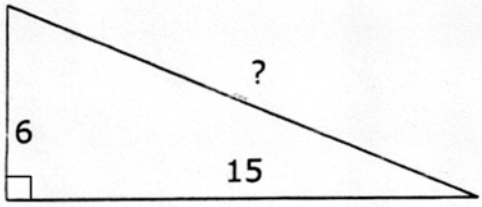
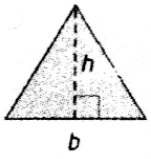
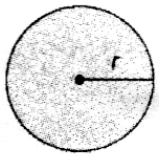
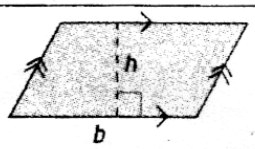
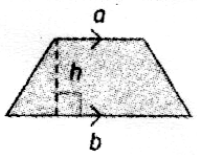


Apply Area Formulas

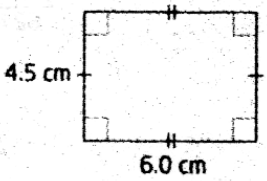
Area measures how much space a two-dimensional shape covers.
It is measured in square units.

The table gives the area formulas of some common shapes.

Shape	Name	Area Formula
	rectangle	$A = lw$
	triangle	$A = \frac{1}{2}bh$
	circle	$A = \pi r^2$
	parallelogram	$A = bh$
	trapezoid	$A = \frac{1}{2}h(a+b)$

Example: Apply Area Formula

Determine the area of the shape.



Solution

Use the formula for the area of a rectangle. Substitute $l = 6.0$ and $w = 4.5$.

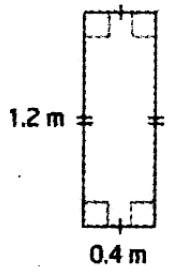
$A = lw$
$= (6.0)(4.5)$
$= 27$

The area of the rectangle is 27 cm^2.

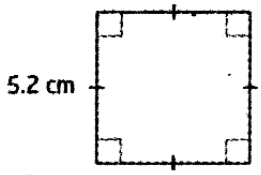
Practise

1. Determine the area of each shape.

a)

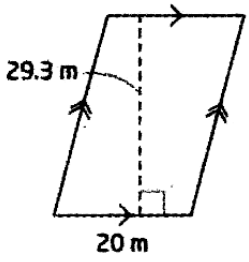


b)

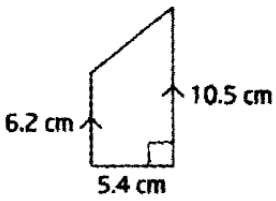


2. Determine the area of each shape.

a)

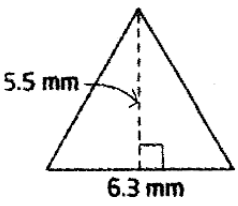


b)

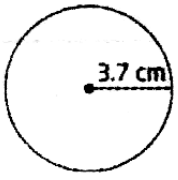


3. Determine the area of each shape. Round answers to the nearest tenth of a square unit.

a)

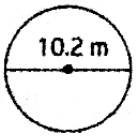


b)

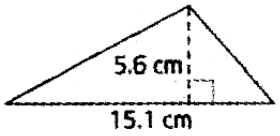


4. Determine the area of each shape. Round answers to the nearest tenth of a square unit.

a)

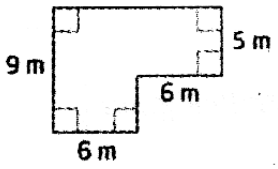


b)

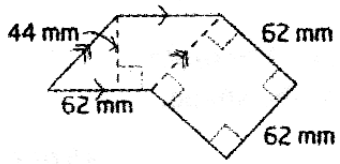


5. Determine the area of each shape.

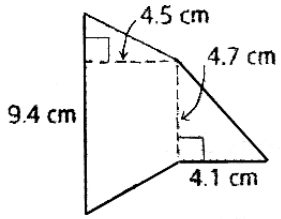
a)



b)



c)



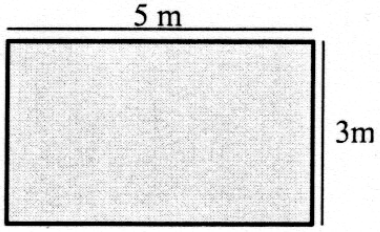
Perimeter and Area

Information Sheet

Perimeter

The **perimeter** of a shape is the **total length of its sides**.

The perimeter of this rectangular lawn = 5 + 3 + 5 + 3 = 16 m

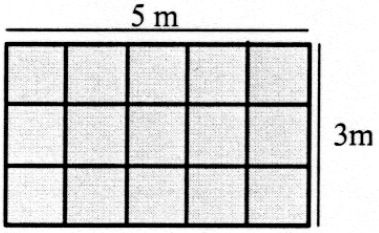


Perimeter of a rectangle	$P = l + w + l + w$	where l is the length and w the width
This can also be written as	$P = 2l + 2w$ or	$P = 2(l + w)$

Area

Area measures the **surface** of something, usually in square metres (m^2), square centimetres (cm^2) or square millimetres (mm^2).

The area of the lawn is 15 m^2



Each square has an area of 1 m^2

Area of a rectangle = length × width		
This can be written as	$A = lw$	where l is the length and w the width

Sometimes you can split shapes into two or more rectangles.

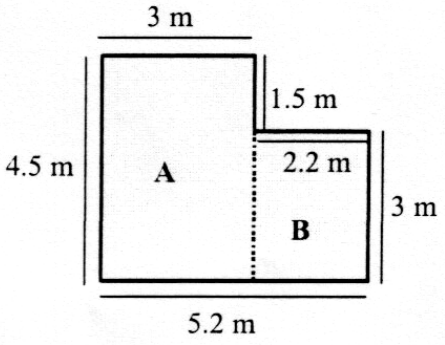
Example

The perimeter of this L-shaped floor
= 3 + 1.5 + 2.2 + 3 + 5.2 + 4.5 = 19.4 m

The area is split into two rectangles, A and B.

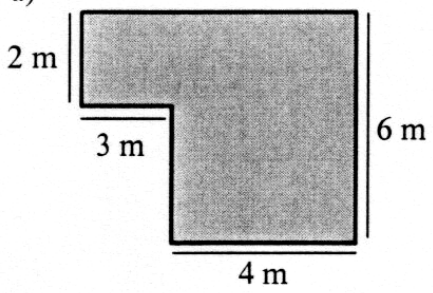
Area of A = 4.5 × 3 = 13.5 m^2
Area of B = 3 × 2.2 = 6.6 m^2

Total area = 13.5 + 6.6 = 20.1 m^2

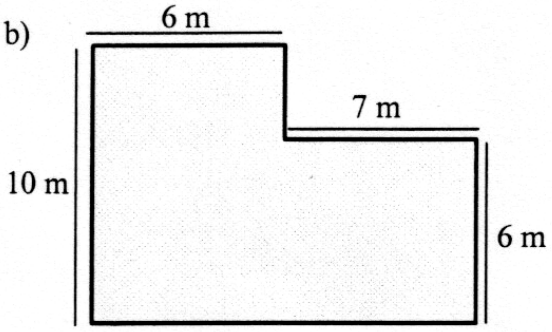


5 Find the perimeter and area of the floor of each room in the diagrams below.

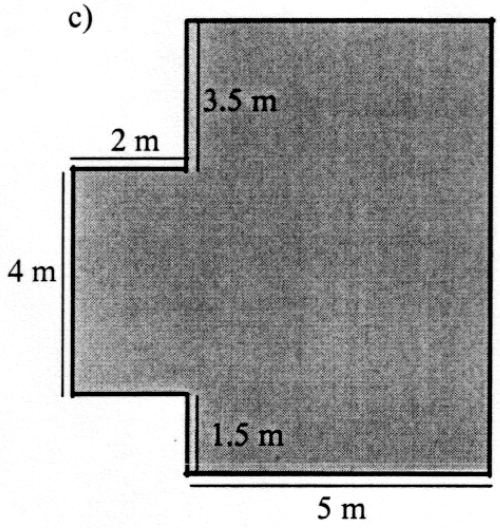
a)



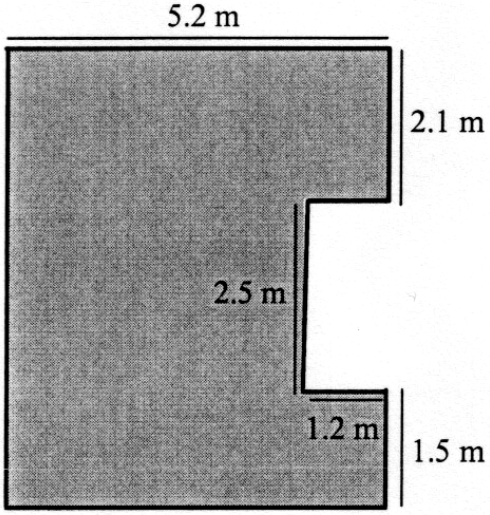
b)



c)

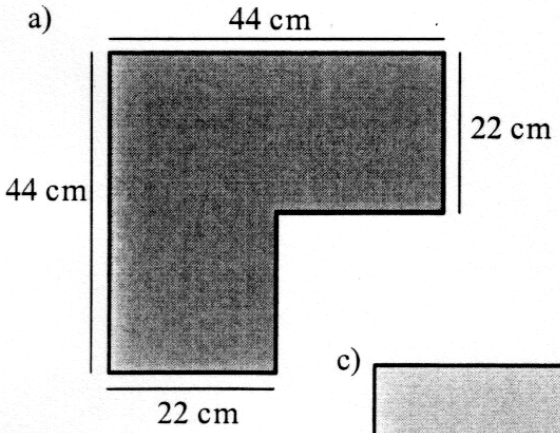


d)

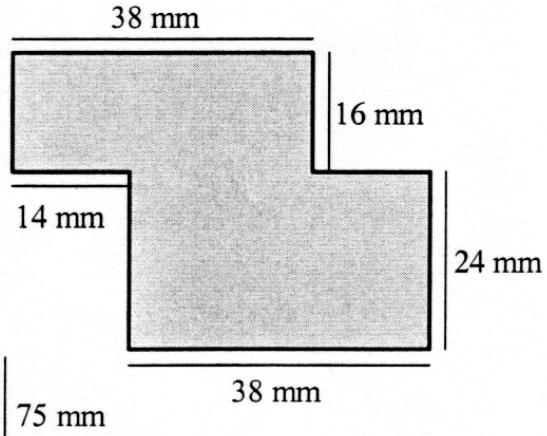


6 Find the perimeter and area of each shape.

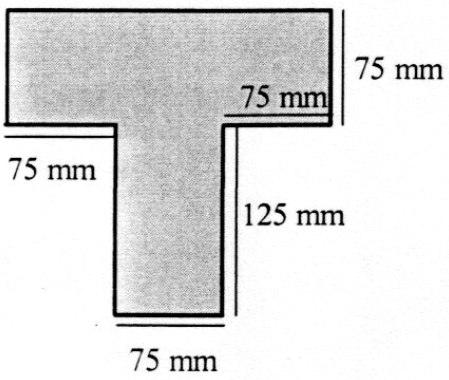
a)



b)



c)



MENTAL MATH PRE-TEST

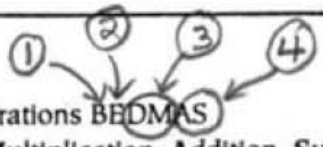
NAME: Mr. Solutions

Let's see how you do WITHOUT a calculator !!

1. $21 - 6 + 18 = 15 + 18 = 33$
2. $555 - 121 = 434$
3. $101 + 765 = 866$
4. $12 \times 4 = 48$
5. $56 \div 8 = 7$
6. $6 \times 5 \div 2 = 30 \div 2 = 15$
7. $0 \times 4 \div 7 = 0 \div 7 = 0$
8. $21 \times 10 = 210$
9. $500 \div 20 = 25$
10. $(18 - 15)^4 = 3^4 = 81$
11. $-4 + 18 = 14$
12. $16 - 29 = -13$
13. $(40 + 24) - 8 \div 2 + 1 = 64 - 4 + 1 = 61$
14. $(-2)(-7) = 14$
15. $(-15) \div (-3) = 5$
16. 0.5 as a fraction $= \frac{1}{2}$
17. 0.45 as a fraction in lowest terms $= \frac{45}{100} = \frac{9}{20}$
18. 3 % as a fraction $= \frac{3}{100}$
19. 0.05 as a percent $= 5\%$
20. $\frac{28}{50}$ as a percent $= 56\%$
21. $\frac{3}{4}$ as a decimal $= 0.75$
22. 130 % as a decimal $= 1.3$
23. Change $4\frac{1}{7}$ to an improper fraction. $\frac{29}{7}$
24. Change $\frac{13}{5}$ to a mixed fraction. $2\frac{3}{5}$
25. $2\frac{1}{2} + 3\frac{1}{2} = \frac{5}{2} + \frac{7}{2} = \frac{12}{2} = 6$
26. $\frac{2}{7} + \frac{5}{14} = \frac{4}{14} + \frac{5}{14} = \frac{9}{14}$
27. $\frac{9}{10} - \frac{7}{10} = \frac{2}{10} = \frac{1}{5}$
28. $1 - \frac{2}{3} = \frac{3}{3} - \frac{2}{3} = \frac{1}{3}$
29. $\frac{1}{5} * \frac{4}{6} = \frac{1 \times 4}{5 \times 6} = \frac{4}{30} = \frac{2}{15}$
30. $\frac{5}{6} \div \frac{2}{3} = \frac{5}{6_2} \times \frac{3}{2} = \frac{5}{4}$
31. $2x + 7x = 9x$
32. $\sqrt{25} = 5$
33. 15% of \$ 3. 00 $= 0.15 \times 3 = \$0.45$
34. area of a rectangle that has width 6cm and length 9 cm $= 6 \times 9 = 54\ cm^2$
35. perimeter of a rectangle that has width 6cm and length 9 cm $= 2(6) + 2(9) = 30\ cm$

Name

Order of operations



Remember to use the order of operations BEDMAS
(Brackets, Exponents, Division, Multiplication, Addition, Subtraction)
to evaluate expressions.

1. $3 \times 8 - 4 + 6 \times 1 \div (4 - 2)$
   $= 3 \times 8 - 4 + 6 \times 1 \div 2$
   $= 24 - 4 + 3$
   $= 23$

2. $8 + 5 \times 2$ ____
   $= 8 + 10$
   $= 18$

3. $6 \times 5 - 2 \times 3$ ____
   $= 30 - 6$
   $= 24$

4. $7 \times 5 - 3 \times 4 + 9$ ____
   $= 35 - 12 + 9$
   $= 23 + 9 = 32$

5. $12 \times 3 + 4 \times 9 - 15$ ____
   $= 36 + 36 - 15$
   $= 72 - 15 = 57$

6. $7 \times 6 - 15 \div 3$ ____
   $= 42 - 5$
   $= 37$

7. $8 - 4 \div 2$ ____
   $= 8 - 2$
   $= 6$

8. $8 \times 3 \div (10 + 2)$ ____
   $= 24 \div 12$
   $= 2$

9. $4 \times 16 \div 2 - 10 + 4$ ____
   $= 64 \div 2 - 10 + 4$
   $= 32 - 10 + 4 = 26$

10. $29 - 16 \div 4 + 8$ ____
    $= 29 - 4 + 8$
    $= 33$

11. $8 \times 5 - 21 \div 3 + 7$ ____
    $= 40 - 7 + 7$
    $= 33 + 7 = 40$

12. $36 \div (15 + 3 - 9)$ ____
    $= 36 \div 9$
    $= 4$

13. $3 + 4 \times (3 + 2)$ ____
    $= 3 + 4 \times 5$
    $= 3 + 20 = 23$

14. $8 - 3 \times (5 - 4)$ ____
    $= 8 - 3 \times 1$
    $= 8 - 3 = 5$

15. $11 - 12 \div 4 + 2 \times (7 - 2)$ ____
    $= 11 - 3 + 2 \times 5$
    $= 11 - 3 + 10 = 18$

16. $\dfrac{3(6-4)+15}{8-1}$ ____
    $= \dfrac{3(2)+15}{7} = \dfrac{21}{7} = 3$

17. $15 \div (3 + 2) + 7 \times 4 - 8 \times 3$ ____
    $= 15 \div 5 + 28 - 24$
    $= 3 + 28 - 24 = 7$

18. $14 - 8 \div 4 + 0 \times (5 - 3)$ ____
    $= 14 - 2 + 0 \times 2$
    $= 14 - 2 + 0 = 12$

19. $25 + 3 \times 4 - 8 \div 2$ ____
    $= 25 + 12 - 4$
    $= 33$

20. $\dfrac{7 \times 5 - (3 + 2)}{(20 \div 2 \times 3) \div 2}$ ____
    $= \dfrac{35 - 5}{30 \div 2} = \dfrac{30}{15} = 2$

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Name

Adding integers

Evaluate each of the following.

1. $(+15) + (-7) + (+1)$

$= 15 - 7 + 1$
$= 9$

2. $(+9) + (-7)$ 2

$= 9 - 7$
$= 2$

3. $(-14) + (+6)$ -8

$= -14 + 6$
$= -8$

4. $(-8) + (-9)$ -17

$= -8 - 9$
$= -17$

5. $(-5) + (-6) + (+4)$ -7

$= -5 - 6 + 4$
$= -7$

6. $(-7) + (+9) + (+5)$ 7

$= -7 + 9 + 5$
$= 7$

7. $(-5) + (+4) + (-8)$ -9

$= -5 + 4 - 8$
$= -9$

8. $(+12) + (-11) + (-4)$ -3

$= 12 - 11 - 4$
$= -3$

9. $(-12) + (-7) + (+12)$ -7

$= -12 - 7 + 12$
$= -7$

10. $(-14) + (+7) + (-8) + (-4)$ -19

$= -14 + 7 - 8 - 4$
$= -19$

11. $14 + (-9) + 10$ 15

$= 14 - 9 + 10$
$= 15$

12. $-4 + (-12) + 15$ -1

$= -4 - 12 + 15$
$= -1$

13. $12 + (-5) + (-7)$ 0

$= 12 - 5 - 7$
$= 0$

14. $-9 + (-23) + 14 + 5$ -13

$= -9 - 23 + 14 + 5$
$= -13$

15. $-5 + 6 + 13 + (-9)$ 5

$= -5 + 6 + 13 - 9$
$= 5$

16. $13 + (-17) + 3 + (-9)$ -10

$= 13 - 17 + 3 - 9$
$= -10$

17. $-8 + 5 + (-5) + 12$ 4

$= -8 + 5 - 5 + 12$
$= 4$

18. $-15 + (-12) + (-3) + 9 + 25$ 4

$= -15 - 12 - 3 + 9 + 25$
$= 4$

19. $-7 + 9 + 12 + (-18) + (-20)$ -24

$= -7 + 9 + 12 - 18 - 20$
$= -24$

20. $-9 + (-18) + 7 + (-15) + 12 + 9$ -14

$= -9 - 18 + 7 - 15 + 12 + 9$
$= -14$

Name

Subtracting integers

Evaluate each of the following.

1. $8-(-3)-(+5)$

$= 8+3-5$
$= 6$

2. $9-(+4)$ 5

$=9-4$
$=5$

3. $-4-(-7)$ 3

$=-4+7$
$=3$

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

$=-6+2$
$=-4$

5. $15-(-17)$ 32

$=15+17$
$=32$

6. $-3-(-5)$ 2

$=-3+5$
$=2$

7. $-9-(7)$ -16

$=-9-7$
$=-16$

8. $-8-(-11)$ 3

$=-8+11$
$=3$

9. $-5-(-12)$ 7

$=-5+12$
$=7$

10. $25-(-35)$ 60

$=25+35$
$=60$

11. $0-(-7)$ 7

$=0+7$
$=7$

12. $0-(-12)$ 12

$=0+12$
$=12$

13. $(+8)-(+14)+(-2)$ -8

$=8-14-2$
$=-8$

14. $(-6)-(-5)-(8)$ -9

$=-6+5-8$
$=-9$

15. $(+7)+(-9)-(-6)$ 4

$=7-9+6$
$=4$

16 $-3-(-4)+(+12)$ 13

$=-3+4+12$
$=13$

17. $6-(-7)-(-8)$ 21

$=6+7+8$
$=21$

18 $-5+8-(-12)$ 15

$=-5+8+12$
$=15$

19. $(-2)+(-7)-(-9)+(-5)$ -5

$=-2-7+9-5$
$=-5$

20 $-7-(-12)-(5)+(-3)$ -3

$=-7+12-5-3$
$=-3$

Name

Multiplying integers

Evaluate each of the following.

1. $4(6)(-2)(-1)$
   $= 4(6)(2)$
   $= 48$
2. $7(12) = 84$ ___
3. $5(-3) = -15$ ___
4. $5(16) = 80$ ___
5. $-4(2) = -8$ ___
6. $10(-7) = -70$ ___
7. $-6(-10) = 60$ ___
8. $-5(-7) = 35$ ___
9. $-8(-8) = 64$ ___
10. $-5(15) = -75$ ___
11. $-8(-20) = 160$ ___
12. $16(-5) = -80$ ___
13. $-17(-4) = 68$ ___
14. $12(-9) = -108$ ___
15. $-15(20) = -300$ ___
16. $8(-5)(-3) = 120$ ___
17. $4(-3)(-2) = 24$ ___
18. $-6(30)(-4) = 720$ ___
19. $-5(-3)(-5) = -75$ ___
20. $(-7)(-2)(-4) = -56$ ___

Name

Dividing integers

Evaluate each of the following.

1. $-12 \div (-6)$
   $= 12 \div 6$
   $= 2$
2. $25 \div 5 = 5$ ___
3. $18 \div 3 = 6$ ___
4. $27 \div 9 = 3$ ___
5. $24 \div (-8) = -3$ ___
6. $(-63) \div 9 = -7$ ___
7. $(-54) \div (-6) = 9$ ___
8. $16 \div (-2) = -8$ ___
9. $(-96) \div (-8) = 12$ ___
10. $(-35) \div (5) = -7$ ___
11. $-48 \div (12) = -4$ ___
12. $-28 \div (-7) = 4$ ___
13. $-40 \div 8 = -5$ ___
14. $144 \div (-12) = -12$ ___
15. $-81 \div (-9) = 9$ ___
16. $-120 \div 10 = -12$ ___
17. $\frac{-36}{9} = -4$ ___
18. $\frac{24}{-4} = -6$ ___
19. $\frac{54}{-6} = -9$ ___
20. $\frac{-20}{5} = -4$ ___

Name

Evaluating expressions

Remember to use BEDMAS —
Brackets, Exponents, Division and Multiplication (in order)
then Addition and Subtraction (in order).

1. $8 + (-2)(-5) \div [4 - (-1)] - 4(-2 + 3)$
   $= 8 + 10 \div [5] - 4(1)$
   $= 8 + 2 - 4$
   $= 6$

2. $12 + 15 \div (-3)$ ____7____
   $= 12 + (-5)$
   $= 12 - 5 = 7$

3. $-6 + (-14) \div (-7)$ ____-4____
   $= -6 + 2$
   $= -4$

4. $-18 - (9)(3)$ ____-45____
   $= -18 - 27$
   $= -45$

5. $30 \div (-2) - (-3)(4)$ ____-3____
   $= -15 - (-12)$
   $= -15 + 12 = -3$

6. $-7 - (-3)(-5)$ ____-22____
   $= -7 - 15$
   $= -22$

7. $(-7 + 19) \div 4$ ____3____
   $= 12 \div 4$
   $= 3$

8. $64 - 7 \times (8 - 2)$ ____22____
   $= 64 - 7(6)$
   $= 64 - 42 = 22$

9. $8 + 3 \times (2 - 5)$ ____-1____
   $= 8 + 3(-3)$
   $= 8 + (-9) = 8 - 9 = -1$

10. $-5 - 6 \times (4 - 9)$ ____25____
    $= -5 - 6(-5)$
    $= -5 - (-30) = -5 + 30 = 25$

11. $[-17 - (-4)] \times [-6 - 4]$ ____130____
    $= [-17 + 4][-10]$
    $= [-13][-10] = 130$

12. $(-8)(3) + 12 \div (-6)$ ____-26____
    $= -24 + (-2)$
    $= -24 - 2 = -26$

13. $(-14 + 3 - 7) \div [-10 - (-4)]$ ____3____
    $= (-18) \div (-6)$
    $= 3$

14. $-6 \times (3 - 12) - 4 \times (-1 + 6)$ ____34____
    $= -6(-9) - 4(5)$
    $= 54 - 20 = 34$

15. $15 - 24 \div (-6) + 5(-7)$ ____-16____
    $= 15 - (-4) + (-35)$
    $= 15 + 4 - 35 = -16$

16. $27 \div [(-3)(3)] - 4(-3 - 1)$ ____13____
    $= 27 \div (-9) - 4(-4)$
    $= -3 - (-16) = -3 + 16 = 13$

17. $\left(\frac{28}{4}\right) + \left(\frac{-14}{2}\right)$ ____0____
    $= 7 + (-7) = 7 - 7 = 0$

18. $\left(\frac{81}{-9}\right) - \left(\frac{-28}{-7}\right)$ ____-13____
    $= -9 - 4 = -13$

19. $\left(\frac{26}{-13}\right) - \left(\frac{-15}{-3}\right)$ ____-7____
    $= -2 - 5$
    $= -7$

20. $\frac{-16 - 11 - 27 \div 9}{(5 - 7)(-4 - 1)}$ ____3____
    $= \frac{-16 - 11 - 3}{2(-5)} = \frac{-30}{-10} = 3$

Lowest Common Denominator

The lowest common denominator (LCD) is the **lowest common multiple** of the denominators of two or more fractions. You can find the LCD using multiples or prime factors.

Example: LCD of Two Fractions

Find the LCD for $\frac{1}{6}$ and $\frac{1}{8}$.

Solution

Method 1: Use Multiples

List the multiples of 6 and 8 until a common value is reached.

6, 12, 18, **24**

8, 16, **24**

The LCD for $\frac{1}{6}$ and $\frac{1}{8}$ is 24.

Method 2: Use Prime Factors

$6 = 2 \times 3$

$8 = 2 \times 2 \times 2$

The LCD will have all the prime factors of each number.

Start with the factors of the first number. Add any missing factors from the next number.

$LCD = 2 \times 3 \times 2 \times 2$

$= 24$

The LCD is 24.

Practise

1. Use multiples to find the LCD for each pair of fractions.

a) $\frac{1}{2}, \frac{1}{3}$ — 2, 4, (6) / 3, (6), 9 LCD = 6

b) $\frac{1}{4}, \frac{1}{5}$ — 4, 8, 12, 16, (20) / 5, 10, 15, (20)

c) $\frac{1}{3}, \frac{1}{7}$ — 3, 6, 9, 12, 15, 18, (21) / 7, 14, (21), 28

d) $\frac{1}{8}, \frac{1}{9}$ — 8, 16, 24, 32, 40, 48, 56, 64, (72) / 9, 18, 27, 36, 45, 54, 63, (72)

2. Use prime factors to find the LCD for each pair of fractions.

a) $\frac{1}{4}, \frac{1}{8}$ — $4 = (2 \times 2)$, $8 = (2 \times 2) \times (2)$ LCD = $2 \times 2 \times 2 = 8$

b) $\frac{1}{6}, \frac{1}{18}$ — $6 = (2 \times 3)$, $18 = (2 \times 3) \times (3)$ LCD = $2 \times 3 \times 3 = 18$

c) $\frac{1}{8}, \frac{1}{16}$ — $8 = (2 \times 2 \times 2)$, $16 = (2 \times 2 \times 2 \times 2)$ LCD = $2 \times 2 \times 2 \times 2 = 16$

d) $\frac{1}{9}, \frac{1}{27}$ — $9 = (3 \times 3)$, $27 = (3 \times 3) \times 3$ LCD = $3 \times 3 \times 3 = 27$

3. Use multiples to find the LCD for each pair of fractions.

a) $\frac{1}{4}, \frac{1}{6}$ 4, 8, 12 / 6, 12, 18 LCD = 12

b) $\frac{1}{4}, \frac{1}{10}$ 4, 8, 12, 16, 20 / 10, 20 LCD = 20

c) $\frac{1}{6}, \frac{1}{10}$ 6, 12, 18, 24, 30, 36 / 10, 20, 30 LCD = 30

d) $\frac{1}{8}, \frac{1}{20}$ 8, 16, 24, 32, 40 / 20, 40 LCD = 40

4. Use prime factors to find the LCD for each pair of fractions.

a) $\frac{1}{4}, \frac{1}{14}$ $4 = 2 \times 2$, $14 = 2 \times 7$ LCD = $2 \times 2 \times 7 = 28$

b) $\frac{1}{6}, \frac{1}{15}$ $6 = 2 \times 3$, $15 = 3 \times 5$ LCD = $2 \times 3 \times 5 = 30$

c) $\frac{1}{8}, \frac{1}{10}$ $8 = 2 \times 2 \times 2$, $10 = 2 \times 5$ LCD = $2 \times 2 \times 2 \times 5 = 40$

d) $\frac{1}{9}, \frac{1}{12}$ $9 = 3 \times 3$, $12 = 2 \times 2 \times 3$ LCD = $2 \times 2 \times 3 \times 3 = 36$

5. Find the LCD for each set of fractions.

a) $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ LCD = 12

b) $\frac{1}{4}, \frac{1}{5}, \frac{1}{10}$ LCD = 20

6. Find the LCD for each set of fractions.

a) $\frac{1}{3}, \frac{1}{4}, \frac{1}{6}$ LCD = 12

b) $\frac{1}{2}, \frac{1}{5}, \frac{1}{15}$ LCD = 30

7. Use the LCD to write equivalent fractions.

a) $\frac{5}{6}, \frac{2}{9}$ LCD = 18

$\frac{5}{6} \times \frac{3}{3} = \frac{15}{18}$, $\frac{2}{9} \times \frac{2}{2} = \frac{4}{18}$

$8 = 2 \times 2 \times 2$, $12 = 2 \times 2 \times 3$

b) $\frac{3}{8}, \frac{5}{12}$ LCD = $2 \times 2 \times 2 \times 3 = 24$

c) $\frac{1}{2}, \frac{3}{4}, \frac{1}{6}$ $2 = 2$, $4 = 2 \times 2$, $6 = 2 \times 3$

$\therefore$ LCD = $2 \times 2 \times 3 = 12$

d) $\frac{2}{3}, \frac{1}{6}, \frac{7}{9}$ LCD = 18

Multiply and Divide Fractions

To multiply fractions, divide the numerator and the denominator by any common factors. Any mixed numbers should first be converted to improper fractions. To divide by a fraction, multiply by its **reciprocal**.

Example 1: Multiply Fractions

Multiply.

a) $\frac{8}{9}\times\frac{3}{4}$ **b)** $1\frac{2}{3}\times1\frac{1}{4}$

Solution

a) $\frac{8}{9}\times\frac{3}{4}=\frac{\overset{2}{\cancel{8}}}{\underset{3}{\cancel{9}}}\times\frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{4}}}$

$=\frac{2}{3}\times\frac{1}{1}$

$=\frac{2}{3}$

b) $1\frac{2}{3}\times1\frac{1}{4}=\frac{5}{3}\times\frac{5}{4}$

$=\frac{25}{12}$

$=2\frac{1}{12}$

Example 2: Divide Fractions

Divide.

a) $\frac{2}{5}\div\frac{4}{9}$ **b)** $3\frac{1}{2}\div\frac{6}{7}$

Solution

a) $\frac{2}{5}\div\frac{4}{9}=\frac{\overset{1}{\cancel{2}}}{5}\times\frac{9}{\underset{2}{\cancel{4}}}$

$=\frac{1}{5}\times\frac{9}{2}$

$=\frac{9}{10}$

b) $3\frac{1}{2}\div\frac{6}{7}=\frac{7}{2}\div\frac{6}{7}$

$=\frac{7}{2}\times\frac{7}{6}$

$=\frac{49}{12}$

$=4\frac{1}{12}$

Practise

*Express your answers in **lowest terms**.*

1. Multiply.

a) $\frac{3}{5}\times\frac{6}{7}=\frac{3\times6}{5\times7}=\frac{18}{35}$

b) $\frac{1}{\cancel{3}}\times\frac{\cancel{3}}{4}=\frac{1\times1}{1\times4}=\frac{1}{4}$

2. Multiply.

a) $\frac{5}{\cancel{8}_{2}}\times\frac{\cancel{4}^{1}}{11}=\frac{5\times1}{2\times11}=\frac{5}{22}$

b) $\frac{\cancel{2}^{1}}{7}\times\frac{3}{\cancel{10}_{5}}=\frac{1\times3}{7\times5}=\frac{3}{35}$

3. Multiply.

a) $\frac{1}{3} \times 2\frac{2}{5} = \frac{1}{3} \times \frac{12}{5}$

$= \frac{12}{15}$

b) $1\frac{1}{6} \times \frac{3}{7} = \frac{7}{6} \times \frac{3}{7} = \frac{1}{2}$

c) $4\frac{1}{5} \times 2\frac{2}{3} = \frac{21}{5} \times \frac{8}{3} = \frac{56}{5}$

d) $1\frac{3}{4} \times 2\frac{3}{14} = \frac{7}{4} \times \frac{31}{14} = \frac{31}{8}$

4. Divide.

a) $\frac{4}{7} \div \frac{1}{2} = \frac{4}{7} \times \frac{2}{1}$

$= \frac{8}{7}$

b) $\frac{4}{9} \div \frac{2}{3} = \frac{4}{9} \times \frac{3}{2}$

$= \frac{2}{3}$

c) $\frac{5}{12} \div \frac{3}{10} = \frac{5}{12} \times \frac{10}{3}$

$= \frac{25}{18}$

d) $\frac{2}{3} \div \frac{7}{15} = \frac{2}{3} \times \frac{15}{7}$

$= \frac{10}{7}$

5. Divide.

a) $1\frac{1}{4} \div \frac{4}{5} = \frac{5}{4} \div \frac{4}{5}$

$= \frac{5}{4} \times \frac{5}{4} = \frac{25}{16}$

b) $2\frac{7}{8} \div \frac{3}{4} = \frac{23}{8} \div \frac{3}{4}$

$= \frac{23}{8} \times \frac{4}{3} = \frac{23}{6}$

c) $3\frac{1}{5} \div 2\frac{2}{3} = \frac{16}{5} \div \frac{8}{3}$

$= \frac{16}{5} \times \frac{3}{8} = \frac{6}{5}$

d) $1\frac{2}{9} \div 7\frac{1}{3} = \frac{11}{9} \div \frac{22}{3}$

$= \frac{11}{9} \times \frac{3}{22}$

$= \frac{1}{6}$

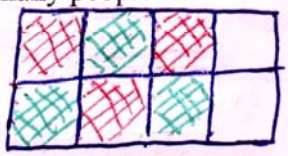
6. A jar of jelly beans is $\frac{2}{3}$ full. $\frac{3}{8}$ of these jelly beans are orange. What fraction of the full jar are the orange jelly beans?

$\frac{3}{8}$ of $\frac{2}{3} = \frac{3}{8} \times \frac{2}{3} = \frac{1}{4}$

One-quarter of the full jar consists of orange jelly beans.

$\frac{3}{12}$ of full jar consists of orange jelly beans

7. A bowl of strawberries is $\frac{3}{4}$ full. Janice and her friends had each eaten $\frac{1}{8}$ of a bowl of strawberries. How many people ate strawberries?



$\frac{3}{4} \div \frac{1}{8} = \frac{3}{4} \times \frac{8}{1}$

$= \frac{6}{1}$

$= 6$

Six people ate strawberries.

Practise

1. Find each sum or difference. Express your answers in **lowest terms**.

a) $\frac{4}{9}+\frac{8}{9} = \frac{12}{9} = \frac{4}{3}$

b) $\frac{3}{8}+\frac{7}{8} = \frac{10}{8} = \frac{5}{4}$

c) $\frac{3}{4}-\frac{1}{4} = \frac{2}{4} = \frac{1}{2}$

d) $\frac{9}{10}-\frac{3}{10} = \frac{6}{10} = \frac{3}{5}$

2. Find each sum.

a) $\frac{5}{6}+\frac{1}{3} = \frac{5}{6}+\frac{2}{6} = \frac{7}{6}$

b) $\frac{3}{10}+\frac{2}{5} = \frac{3}{10}+\frac{4}{10} = \frac{7}{10}$

c) $\frac{5}{12}+\frac{1}{6} = \frac{5}{12}+\frac{2}{12} = \frac{7}{12}$

3. Find each sum.

a) $\frac{2}{3}+\frac{3}{5} = \frac{10}{15}+\frac{9}{15}$

$= \frac{19}{15}$

b) $\frac{5}{6}+\frac{3}{7} = \frac{35}{42}+\frac{18}{42}$

$= \frac{53}{42}$

c) $\frac{2}{9}+\frac{5}{12} = \frac{8}{36}+\frac{15}{36}$

$= \frac{23}{36}$

4. Find each difference.

a) $\frac{7}{8}-\frac{1}{3} = \frac{21}{24}-\frac{8}{24} = \frac{13}{24}$

b) $\frac{8}{9}-\frac{1}{6} = \frac{16}{18}-\frac{3}{18} = \frac{13}{18}$

c) $\frac{5}{6}-\frac{5}{8} = \frac{20}{24}-\frac{15}{24} = \frac{5}{24}$

5. Find each difference.

a) $3\frac{2}{7}-2\frac{1}{2} = \frac{23}{7}-\frac{5}{2}$

$= \frac{46}{14}-\frac{35}{14} = \frac{11}{14}$

b) $1\frac{5}{9}-\frac{3}{5} = \frac{14}{9}-\frac{3}{5}$

$= \frac{70}{45}-\frac{27}{45} = \frac{43}{45}$

c) $2\frac{2}{5}-1\frac{1}{3} = \frac{12}{5}-\frac{4}{3}$

$= \frac{36}{15}-\frac{20}{15} = \frac{16}{15}$

6. During one week, it rained for $2\frac{1}{2}$ h on Monday, $1\frac{3}{4}$ h on Tuesday, and $2\frac{5}{6}$ h on Wednesday.

a) Find the total period of rainfall for this week.

$2\frac{1}{2}+1\frac{3}{4}+2\frac{5}{6} = \frac{5}{2}+\frac{7}{4}+\frac{17}{6}$

$= \frac{30}{12}+\frac{21}{12}+\frac{34}{12}$

$= \frac{85}{12} = 7\frac{1}{12}$ hours

b) How much longer did rain on Wednesday than on Tuesday?

$2\frac{5}{6}-1\frac{3}{4} = \frac{17}{6}-\frac{7}{4} = \frac{34}{12}-\frac{21}{12}$

$= \frac{13}{12} = 1\frac{1}{12}$ hours.

Substituting into Algebraic Expressions

Substitute and evaluate.

1. $8w - 11$ for $w = 9$

$8w - 11$
$= 8(9) - 11$
$= 72 - 11$
$= 61$

2. $b \div 4 - 6$ for $b = 32$

$b \div 4 - 6$
$= 32 \div 4 - 6$
$= 8 - 6$
$= 2$

3. $7v + 34$ for $v = 8$

$7v + 34$
$= 7(8) + 34$
$= 56 + 34$
$= 90$

4. $5k$ for $k = 4$

$5k$
$= 5(4)$
$= 20$

5. $9e$ for $e = 2$

$9e$
$= 9(2)$
$= 18$

6. $\frac{d}{6} + 28$ for $d = 36$

$\frac{d}{6} + 28$
$= \frac{36}{6} + 28 = 6 + 28$
$= 34$

7. $2n + 31$ for $n = 6$

$2n + 31$
$= 2(6) + 31$
$= 12 + 31$
$= 42$

8. $6c - 21$ for $c = 4$

$6c - 21$
$= 6(4) - 21$
$= 24 - 21$
$= 3$

9. $4z + 8$ for $z = 8$

$4z + 8$
$= 4(8) + 8$
$= 32 + 8$
$= 40$

10. $8x$ for $x = 2$

$8x$
$= 8(2)$
$= 16$

11. $5t - 10$ for $t = 7$

$5t - 10$
$= 5(7) - 10$
$= 35 - 10$
$= 25$

12. $f \div 5 + 16$ for $f = 35$

$f \div 5 + 16$
$= 35 \div 5 + 16$
$= 7 + 16 = 23$

13. $\frac{j}{2} + j$ for $j = 6$

$\frac{j}{2} + 6$
$= \frac{6}{2} + 6 = 3 + 6 = 9$

14. $9u$ for $u = 3$

$9u$
$= 9(3)$
$= 27$

15. $3k + 50$ for $k = 2$

$3k + 50$
$= 3(2) + 50$
$= 6 + 50$
$= 56$

16. $2s$ for $s = 7$

$2s$
$= 2(7)$
$= 14$

17. $m \div 8 - 2$ for $m = 32$

$m \div 8 - 2$
$= 32 \div 8 - 2$
$= 4 - 2$
$= 2$

18. $6t - 24$ for $t = 5$

$6t - 24$
$= 6(5) - 24$
$= 30 - 24$
$= 6$

19. $7g + 41$ for $g = 9$

$7g + 41$
$= 7(9) + 41$
$= 63 + 41$
$= 104$

20. $5y - 7$ for $y = 3$

$5y - 7$
$= 5(3) - 7$
$= 15 - 7$
$= 8$

Solving Equations

Solve each equation.

1. $83 + t = 139$

$\therefore 83+t-83 = 139-83$

$\therefore t = 56$

2. $s + 12 = 70$

$\therefore s+12-12 = 70-12$

$\therefore s = 58$

3. $91 = q + 19$

$\therefore 91-19 = q+19-19$

$\therefore 72 = q$

4. $104 = 74 + x$

$\therefore 104-74 = 74+x-74$

$\therefore 30 = x$

5. $f - 45 = 13$

$\therefore f-45+45 = 13+45$

$\therefore f = 58$

6. $76 - y = 4$

$\therefore 76-y-76 = 4-76$

$\therefore -y = -72$

$\therefore y = 72$

7. $4 = w - 31$

$\therefore 4+31 = w-31+31$

$\therefore 35 = w$

8. $1 = 55 - z$

$\therefore 1-55 = 55-z-55$

$\therefore -54 = -z$

$\therefore 54 = z$

9. $95 + c = 123$

$\therefore 95+c-95 = 123-95$

$\therefore c = 28$

10. $162 = 86 + j$

$\therefore 162-86 = 86+j-86$

$\therefore 76 = j$

11. $v + 63 = 80$

$\therefore v+63-63 = 80-63$

$\therefore v = 17$

12. $58 = 35 + r$

$\therefore 58-35 = 35+r-35$

$\therefore 23 = r$

13. $63 = 66 - b$

$\therefore 63-66 = 66-b-66$

$\therefore -3 = -b$

$\therefore 3 = b$

14. $25 = x - 17$

$\therefore 25+17 = x-17+17$

$\therefore 42 = x$

15. $79 - g = 22$

$\therefore 79-g-79 = 22-79$

$\therefore -g = -57$

$\therefore g = 57$

16. $w - 18 = 13$

$\therefore w-18+18 = 13+18$

$\therefore w = 31$

17. $92 = 18 + e$

$\therefore 92-18 = 18+e-18$

$\therefore 74 = e$

18. $58 = p + 20$

$\therefore 58-20 = p+20-20$

$\therefore 38 = p$

19. $77 = 62 + q$

$\therefore 77-62 = 62+q-62$

$\therefore 15 = q$

20. $28 + h = 110$

$\therefore 28+h-28 = 110-28$

$\therefore h = 82$

21. $z - 24 = 72$

$\therefore z-24+24 = 72+24$

$\therefore z = 96$

22. $59 = c - 13$

$\therefore 59+13 = c-13+13$

$\therefore 72 = c$

23. $65 - p = 59$

$\therefore 65-p-65 = 59-65$

$\therefore -p = -6$

$\therefore p = 6$

24. $26 = 81 - j$

$\therefore 26-81 = 81-j-81$

$\therefore -55 = -j$

$\therefore 55 = j$

Course: MPM 1D0 **Welcome Quiz** **Name:** Mr. Solutions **/21**

1. Evaluate.

[3] a) $7-13=$ -6 ✓ b) $-5+14=$ 9 ✓ c) $(-3)\times(4)=$ -12 ✓

2. Evaluate.

[3] $2(5-3)\div 4 = 2(2)\div 4 = 4\div 4 = 1$ ✓

3. Evaluate.

[5] a) $\frac{2}{5}+\frac{3}{5}$

$= \frac{2+3}{5}$ ✓

$= \frac{5}{5}$

$= 1$ ✓

b) $\frac{1}{3}\times\frac{2}{5}$

$= \frac{1\times 2}{3\times 5}$ ✓

$= \frac{2}{15}$ ✓

c) $\frac{3}{7}\div\frac{6}{5}$

$= \frac{3}{7}\times\frac{5}{6_2}$ ✓

$= \frac{5}{14}$ ✓

4. Find 15% of 65.

[1] $15\%\text{ of }65 = 0.15\times 65 = 9.75$

5. Solve for unknown.

[2] $3x-1=8$

$\therefore 3x-1+1=8+1$ ✓

$\therefore 3x=9$

$\therefore \frac{3x}{3}=\frac{9}{3}$

$\therefore x=3$ ✓

6. Find the **perimeter** and the **area** of a rectangle with dimensions 12mx7m.

[4]

$P = 2\times 12 + 2\times 7$ ✓

$= 24+14$ ✓

$= 38\text{ m}$ ✓

$A = lw$ ✓

$= 12(7)$

$= 84\text{ m}^2$ ✓

perimeter = "distance around"

area = "space inside"

7. Find three consecutive numbers whose sum is 12 and product is 60.

[3] Let x represent the smallest number. Then, the next two consecutive numbers are $x+1$ and $x+2$

"add" sum of consecutive numbers is 12

$x+x+1+x+2 = 12$

$\therefore 3x+3=12$

$\therefore 3x+3-3=12-3$

$\therefore 3x=9$

$\therefore x=3$

Therefore, the three consecutive numbers are 3, 4 and 5.

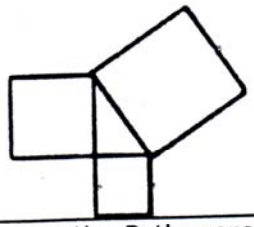
Check: $3+4+5=12$

$3(4)(5)=12(5)=60$

Find three consecutive numbers whose sum is 12 and product is 60.

3 numbers in a row — add up to 12 — multiply to 60

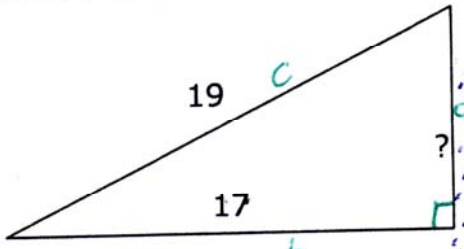
The Pythagorean Theorem



The theorem states that the square of the hypotenuse is the sum of the squares of the legs. Always understand that the Pythagorean Theorem relates the areas of squares on the sides of the right triangle.

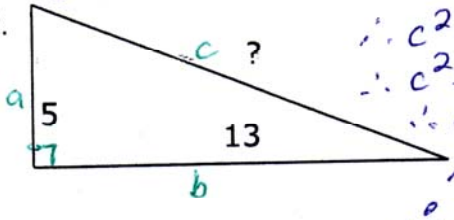
Use the Pythagorean Theorem to find the missing ~~side~~ length.

1.



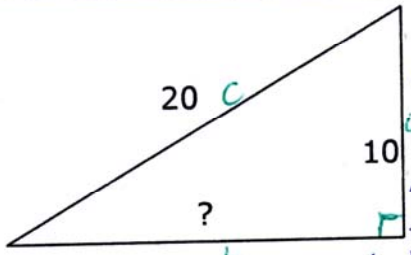
$c^2 = a^2 + b^2$
$\therefore 19^2 = a^2 + 17^2$
$\therefore a^2 = 19^2 - 17^2$
$\therefore a^2 = 72$
$\therefore a = \sqrt{72}$
$\therefore a \doteq 8.5$

2.



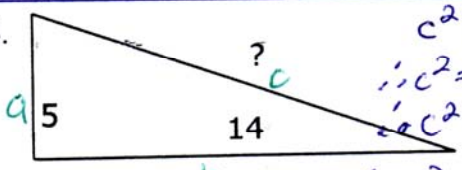
$c^2 = a^2 + b^2$
$\therefore c^2 = 5^2 + 13^2$
$\therefore c^2 = 25 + 169$
$\therefore c^2 = 194$
$\therefore c = \sqrt{194}$
$\therefore c \doteq 13.9$

3.



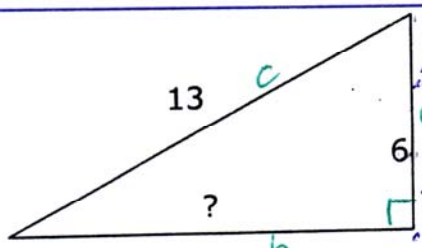
$c^2 = a^2 + b^2$
$\therefore 20^2 = 10^2 + b^2$
$\therefore b^2 = 20^2 - 10^2$
$\therefore b^2 = 400 - 100$
$\therefore b^2 = 300$
$\therefore b = \sqrt{300} \doteq 17.3$

4.



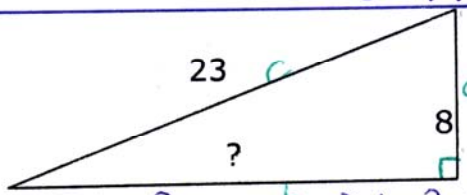
$c^2 = a^2 + b^2$
$\therefore c^2 = 5^2 + 14^2$
$\therefore c^2 = 25 + 196$
$\therefore c^2 = 221$
$\therefore c = \sqrt{221}$
$\therefore c \doteq 14.9$

5.



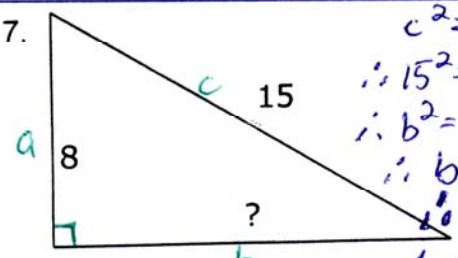
$c^2 = a^2 + b^2$
$\therefore 13^2 = 6^2 + b^2$
$\therefore 169 = 36 + b^2$
$\therefore b^2 = 169 - 36$
$\therefore b^2 = 133$
$\therefore b = \sqrt{133} \doteq 11.5$

6.



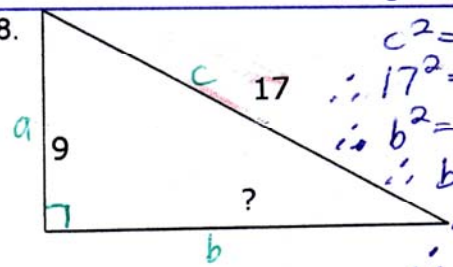
$c^2 = a^2 + b^2$
$\therefore 23^2 = 8^2 + b^2$
$\therefore b^2 = 23^2 - 8^2$
$\therefore b^2 = 465$
$\therefore b = \sqrt{465} \doteq 21.6$

7.



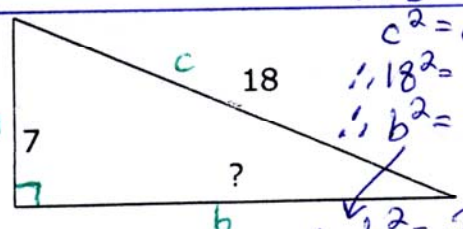
$c^2 = a^2 + b^2$
$\therefore 15^2 = 8^2 + b^2$
$\therefore b^2 = 15^2 - 8^2$
$\therefore b^2 = 161$
$\therefore b = \sqrt{161}$
$\therefore b \doteq 12.7$

8.



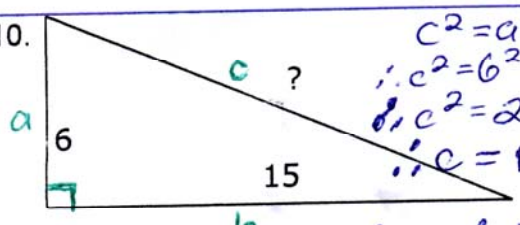
$c^2 = a^2 + b^2$
$\therefore 17^2 = 9^2 + b^2$
$\therefore b^2 = 17^2 - 9^2$
$\therefore b^2 = 208$
$\therefore b = \sqrt{208}$
$\therefore b \doteq 14.4$

9.



$c^2 = a^2 + b^2$
$\therefore 18^2 = 7^2 + b^2$
$\therefore b^2 = 18^2 - 7^2$
$\therefore b^2 = 275$
$\therefore b = \sqrt{275} \doteq 16.6$

10.

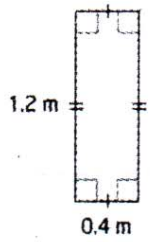


$c^2 = a^2 + b^2$
$\therefore c^2 = 6^2 + 15^2$
$\therefore c^2 = 261$
$\therefore c = \sqrt{261}$
$\therefore c \doteq 16.2$

Practise

1. Determine the area of each shape.

a)



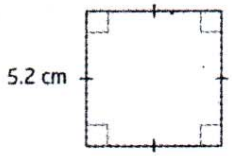
rectangle

$A = lw$

$= (1.2\text{m})(0.4\text{m})$

$= 0.48\ m^2$

b)



Square

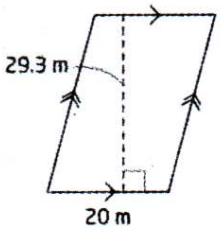
$A = lw$

$= 5.2(5.2)$

$= 27.04\ cm^2$

2. Determine the area of each shape.

a)



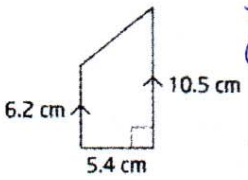
parallelogram

$A = bh$

$= 20(29.3)$

$= 586\ m^2$

b)



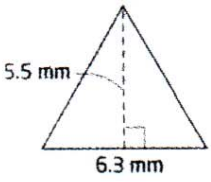
trapezoid
(turn paper sideways)

$A = \frac{h(a+b)}{2}$

$= \frac{5.4(6.2+10.5)}{2} = 45.09\ cm^2$

3. Determine the area of each shape. Round answers to the nearest tenth of a square unit.

a)



triangle

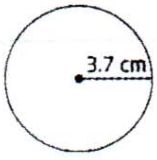
$A = \frac{bh}{2}$

$= \frac{6.3(5.5)}{2}$

$\doteq 17.3\ mm^2$

(to the nearest tenth)

b)



$A = \pi r^2$

$\doteq 3.14(3.7)^2$

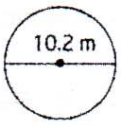
$= 3.14(13.69)$

$\doteq 42.0\ cm^2$

(to the nearest tenth)

4. Determine the area of each shape. Round answers to the nearest tenth of a square unit.

a)



circle

$A = \pi r^2$

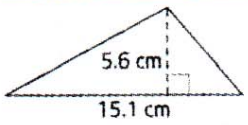
$\doteq 3.14(5.1)^2$

$= 81.6714\ m^2$

$d = 10.2\text{m}$

$r = \frac{10.2}{2}\text{m} = 5.1\text{m}$

b)



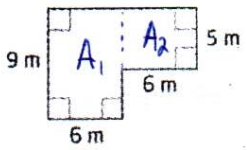
triangle $A = \frac{bh}{2}$

$= \frac{5.6(15.1)}{2}$

$= 42.28\ cm^2$

5. Determine the area of each shape.

a)



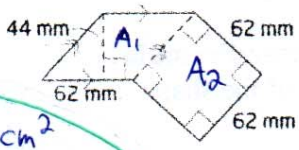
$A = A_1 + A_2$

$= 9(6) + 6(5)$

$= 54 + 30$

$= 84\ m^2$

b)



$A = A_1 + A_2$

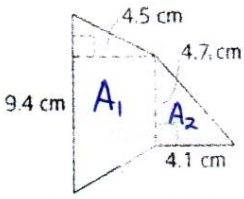
$= bh + lw$

$= 62(44) + 62(62)$

$= 2728 + 3844$

$= 6572\ mm^2$

c)



A_1 - trapezoid

A_2 - triangle

$A = A_1 + A_2$

$= \frac{h(a+b)}{2} + \frac{bh}{2}$

$= \frac{4.5(4.7+9.4)}{2} + \frac{4.1(4.7)}{2}$

$= 31.725 + 9.635$

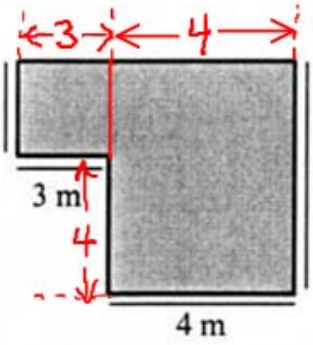
$= 41.36$

$\doteq 41.4\ cm^2$

(to the nearest tenth)

5 Find the perimeter and area of the floor of each room in the diagrams below.

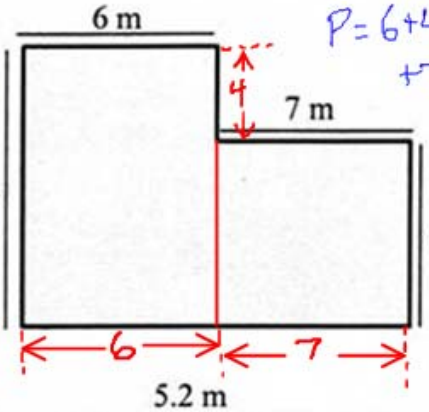
a)



$P = 3+4+6+4+4+3+2 = 26$ m

$A = 2(3) + 4(6) = 30\ m^2$

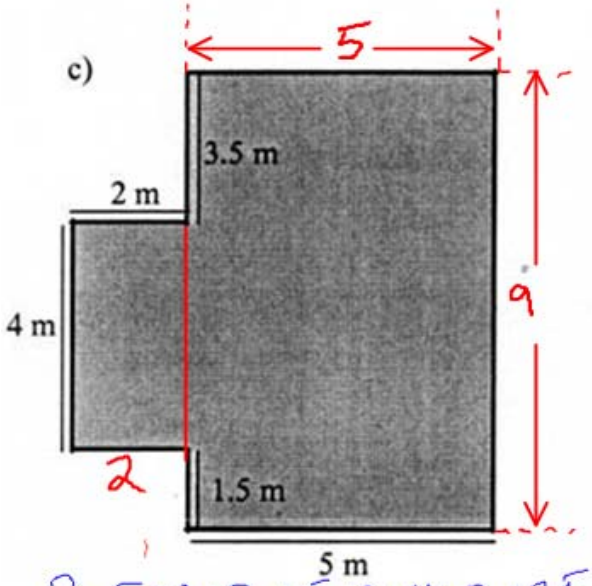
b)



$P = 6+4+7+6+7+6+10 = 46$ m

$A = 6(10) + 7(6) = 60+42 = 102\ m^2$

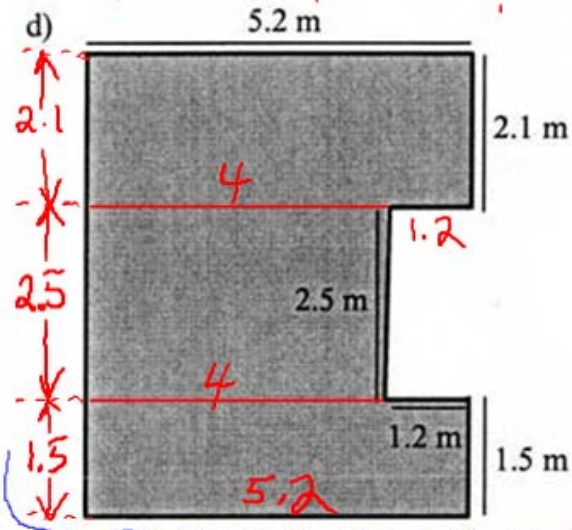
c)



$P = 5+9+5+1.5+2+4+2+3.5 = 32$ m

$A = 2(4) + 5(9) = 8+45 = 53\ m^2$

d)

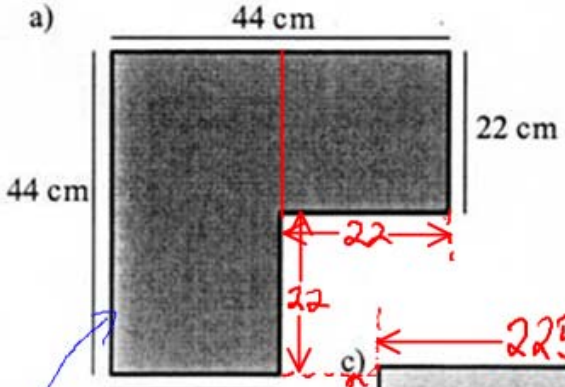


$P = 5.2+2.1+1.2+2.5+1.2+1.5+5.2+1.5+2.5+2.1 = 25$ m

$A = 2.1(5.2) + 4(2.5) + 5.2(1.5) = 28.72\ m^2$

6 Find the perimeter and area of each shape.

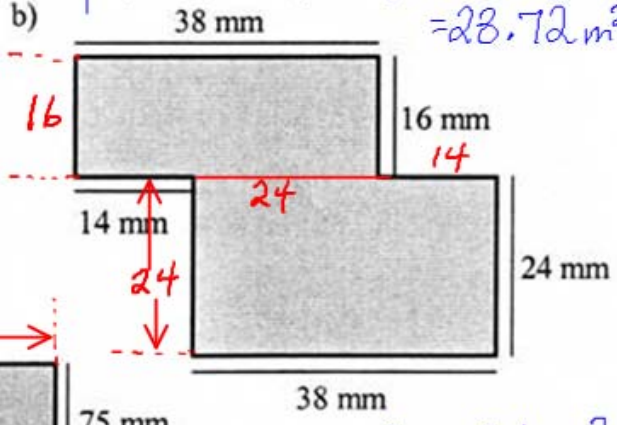
a)



$P = 176$ cm

$A = 1452\ cm^2$

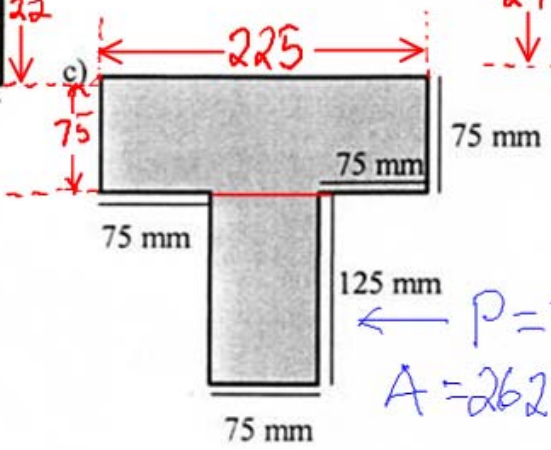
b)



$P = 184\ mm^2$

$A = 1520\ mm^2$

c)



$P = 700$ mm

$A = 26250\ mm^2$