

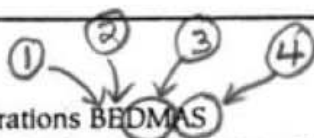
MENTAL MATH PRE-TEST

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. $6 \times 5 + 2 = 30 \div 2 = 15$ ✓
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. $\frac{1}{5} \times \frac{4}{6} = \frac{1 \times 4}{5 \times 6} = \frac{4}{30} = \frac{2}{15}$ ✓
30. $\frac{5}{6} \div \frac{2}{3} = \frac{5}{6} \times \frac{3}{2} = \frac{5}{4}$ ✓
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 $= 6 \times 9 = 54 \text{ cm}^2$ ✓
35. perimeter of a rectangle that has width 6cm and length 9 cm $= 2(6) + 2(9) = 30 \text{ cm}$ ✓

**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. $8 \times 3 \div (10 \div 2)$
$= 24 \div 5$
$= 4.8$ |
| 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. $36 \div (15 \div 3 - 9)$
$= 36 \div 0$
$= \text{undefined}$ |
| 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. $\frac{3(5 - 4) + 15}{8 - 1}$
$= \frac{3(1) + 15}{7} = \frac{18}{7} = 2\frac{4}{7}$ |
| 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. $\frac{7 \times 5 - (3 + 2)}{(20 \div 2 \times 3) \div 2}$
$= \frac{35 - 5}{30 \div 2} = \frac{30}{15} = 2$ |

Adding integers

Evaluate each of the following.

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

$= 15 - 7 + 1$

$= 9$

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

$= -14 + 6$

$= -8$

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

$= -5 - 6 + 4$

$= -7$

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

$= -5 + 4 - 8$

$= -9$

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

$= -12 - 7 + 12$

$= -7$

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

$= 14 - 9 + 10$

$= 15$

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

$= 12 - 5 - 7$

$= 0$

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

$= -5 + 6 + 13 - 9$

$= 5$

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

$= -8 + 5 - 5 + 12$

$= 4$

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

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

$= -24$

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

$= 9 - 7$

$= 2$

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

$= -8 - 9$

$= -17$

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

$= -7 + 9 + 5$

$= 7$

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

$= 12 - 11 - 4$

$= -3$

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

$= -14 + 7 - 8 - 4$

$= -19$

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

$= -4 - 12 + 15$

$= -1$

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

$= -9 - 23 + 14 + 5$

$= -13$

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

$= 13 - 17 + 3 - 9$

$= -10$

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

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

$= 4$

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

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

$= -14$

Subtracting integers

Evaluate each of the following.

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

$= 8 + 3 - 5$

$= 6$

2. $9 - (+4)$

$= 9 - 4$

$= 5$

3. $-4 - (-7)$

$= -4 + 7$

$= 3$

4. $-6 - (-2)$

$= -6 + 2$

$= -4$

5. $15 - (-17)$

$= 15 + 17$

$= 32$

6. $-3 - (-5)$

$= -3 + 5$

$= 2$

7. $-9 - (7)$

$= -9 - 7$

$= -16$

8. $-8 - (-11)$

$= -8 + 11$

$= 3$

9. $-5 - (-12)$

$= -5 + 12$

$= 7$

10. $25 - (-35)$

$= 25 + 35$

$= 60$

11. $0 - (-7)$

$= 0 + 7$

$= 7$

12. $0 - (-12)$

$= 0 + 12$

$= 12$

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

$= 8 - 14 - 2$

$= -8$

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

$= -6 + 5 - 8$

$= -9$

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

$= 7 - 9 + 6$

$= 4$

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

$= -3 + 4 + 12$

$= 13$

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

$= 6 + 7 + 8$

$= 21$

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

$= -5 + 8 + 12$

$= 15$

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

$= -2 - 7 + 9 - 5$

$= -5$

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

$= -7 + 12 - 5 - 3$

$= -3$

Name _____

**Multiplying integers**

Evaluate each of the following.

$$\begin{aligned} 1. \quad & 4(6)(-2)(-1) \\ &= 4(6)(2) \\ &= 48 \end{aligned}$$

$$3. \quad 5(-3) = -15$$

$$5. \quad -4(2) = -8$$

$$7. \quad -6(-10) = 60$$

$$9. \quad -8(-8) = 64$$

$$11. \quad -8(-20) = 160$$

$$13. \quad -17(-4) = 68$$

$$15. \quad -15(20) = -300$$

$$17. \quad 4(-3)(-2) = 24$$

$$19. \quad -5(-3)(-5) = -75$$

$$2. \quad 7(12) = 84$$

$$4. \quad 5(16) = 80$$

$$6. \quad 10(-7) = -70$$

$$8. \quad -5(-7) = 35$$

$$10. \quad -5(15) = -75$$

$$12. \quad 16(-5) = -80$$

$$14. \quad 12(-9) = -108$$

$$16. \quad 8(-5)(-3) = 120$$

$$18. \quad -6(30)(-4) = 720$$

$$20. \quad (-7)(-2)(-4) = -56$$

Name _____

**Dividing integers**

Evaluate each of the following.

$$\begin{aligned} 1. \quad & -12 \div (-6) \\ &= 12 \div 6 \\ &= 2 \end{aligned}$$

$$3. \quad 18 \div 3 = 6$$

$$5. \quad 24 \div (-8) = -3$$

$$7. \quad (-54) \div (-6) = 9$$

$$9. \quad (-96) \div (-8) = 12$$

$$11. \quad -48 \div (12) = -4$$

$$13. \quad -40 \div 8 = -5$$

$$15. \quad -81 \div (-9) = 9$$

$$17. \quad \frac{-36}{9} = -4$$

$$19. \quad \frac{54}{-6} = -9$$

$$2. \quad 25 \div 5 = 5$$

$$4. \quad 27 \div 9 = 3$$

$$6. \quad (-63) \div 9 = -7$$

$$8. \quad 16 \div (-2) = -8$$

$$10. \quad (-35) \div (5) = -7$$

$$12. \quad -28 \div (-7) = 4$$

$$14. \quad 144 \div (-12) = -12$$

$$16. \quad -120 \div 10 = -12$$

$$18. \quad \frac{24}{-4} = -6$$

$$20. \quad \frac{-20}{5} = -4$$

Name

Evaluating expressions

Remember to use BEDMAS —

Brackets, Exponents, Division and Multiplication (in order)
then Addition and Subtraction (in order).

$$\begin{aligned} 1. & 8 + (-2)(-5) \div [4 - (-1)] - 4(-2 + 3) \\ & = 8 + 10 \div [5] - 4(1) \\ & = 8 + 2 - 4 \\ & = 6 \end{aligned}$$

$$\begin{aligned} 3. & -6 + (-14) \div (-7) \\ & = -6 + 2 \\ & = -4 \end{aligned}$$

$$\begin{aligned} 5. & 30 \div (-2) - (-3)(4) \\ & = -15 - (-12) \\ & = -15 + 12 = -3 \end{aligned}$$

$$\begin{aligned} 7. & (-7 + 19) \div 4 \\ & = 12 \div 4 \\ & = 3 \end{aligned}$$

$$\begin{aligned} 9. & 8 + 3 \times (2 - 5) \\ & = 8 + 3(-3) \\ & = 8 + (-9) = 8 - 9 = -1 \end{aligned}$$

$$\begin{aligned} 11. & [-17 - (-4)] \times [-6 - 4] \\ & = [-17 + 4] \times [-10] \\ & = [-13] \times [-10] = 130 \end{aligned}$$

$$\begin{aligned} 13. & (-14 + 3 - 7) \div [-10 - (-4)] \\ & = (-18) \div (-6) \\ & = 3 \end{aligned}$$

$$\begin{aligned} 15. & 15 - 24 \div (-6) + 5(-7) \\ & = 15 - (-4) + (-35) \\ & = 15 + 4 - 35 = -16 \end{aligned}$$

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

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

$$\begin{aligned} 2. & 12 + 15 \div (-3) \\ & = 12 + (-5) \\ & = 12 - 5 = 7 \end{aligned}$$

$$\begin{aligned} 4. & -18 - (9)(3) \\ & = -18 - 27 \\ & = -45 \end{aligned}$$

$$\begin{aligned} 6. & -7 - (-3)(-5) \\ & = -7 - 15 \\ & = -22 \end{aligned}$$

$$\begin{aligned} 8. & 64 - 7 \times (8 - 2) \\ & = 64 - 7(6) \\ & = 64 - 42 = 22 \end{aligned}$$

$$\begin{aligned} 10. & -5 - 6 \times (4 - 9) \\ & = -5 - 6(-5) \\ & = -5 - (-30) = -5 + 30 = 25 \end{aligned}$$

$$\begin{aligned} 12. & (-8)(3) + 12 \div (-6) \\ & = -24 + (-2) \\ & = -24 - 2 = -26 \end{aligned}$$

$$\begin{aligned} 14. & -6 \times (3 - 12) - 4 \times (-1 + 6) \\ & = -6(-9) - 4(5) \\ & = 54 - 20 = 34 \end{aligned}$$

$$\begin{aligned} 16. & 27 \div [(-3)(3)] - 4(-3 - 1) \\ & = 27 \div (-9) - 4(-4) \\ & = -3 - (-16) = -3 + 16 = 13 \end{aligned}$$

$$\begin{aligned} 18. & \left(\frac{81}{-9}\right) - \left(\frac{-28}{-7}\right) \\ & = -9 - 4 = -13 \end{aligned}$$

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

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.

$$\begin{aligned}\text{LCD} &= 2 \times 3 \times 2 \times 2 \\ &= 24\end{aligned}$$

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, 4**5**, 54, 63, **72**

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

a) $\frac{1}{4}, \frac{1}{8}$ 4 = **2x2**, 8 = **2x2x2**
LCD = 2x2x2 = 8

b) $\frac{1}{6}, \frac{1}{18}$ 6 = **2x3**, 18 = **2x3x3**
LCD = 2x3x3 = 18

c) $\frac{1}{8}, \frac{1}{16}$ 8 = **2x2x2**, 16 = **2x2x2x2**
LCD = 2x2x2x2 = 16

d) $\frac{1}{9}, \frac{1}{27}$ 9 = **3x3**, 27 = **3x3x3**
LCD = 3x3x3 = 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
 $\frac{5 \times 3}{6 \times 3} = \frac{15}{18}$, $\frac{2 \times 2}{9 \times 2} = \frac{4}{18}$

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

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

Solution

$$\begin{aligned} \text{a) } \frac{8}{9} \times \frac{3}{4} &= \frac{\overset{2}{\cancel{8}}}{\underset{3}{\cancel{9}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{4}}} \\ &= \frac{2}{3} \times \frac{1}{1} \\ &= \frac{2}{3} \end{aligned}$$

$$\begin{aligned} \text{b) } 1\frac{2}{3} \times 1\frac{1}{4} &= \frac{5}{3} \times \frac{5}{4} \\ &= \frac{25}{12} \\ &= 2\frac{1}{12} \end{aligned}$$

Example 2: Divide Fractions

Divide.

a) $\frac{2}{5} \div \frac{4}{9}$

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

Solution

$$\begin{aligned} \text{a) } \frac{2}{5} \div \frac{4}{9} &= \frac{\overset{1}{\cancel{2}}}{5} \times \frac{9}{\underset{2}{\cancel{4}}} \\ &= \frac{1}{5} \times \frac{9}{2} \\ &= \frac{9}{10} \end{aligned}$$

$$\begin{aligned} \text{b) } 3\frac{1}{2} \div \frac{6}{7} &= \frac{7}{2} \div \frac{6}{7} \\ &= \frac{7}{2} \times \frac{7}{6} \\ &= \frac{49}{12} \\ &= 4\frac{1}{12} \end{aligned}$$

Practise

Express your answers in **lowest terms**.

1. Multiply.

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

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

2. Multiply.

a) $\frac{5}{8} \times \frac{4}{11} = \frac{5 \times 1}{2 \times 11} = \frac{5}{22}$

b) $\frac{2}{7} \times \frac{3}{10} = \frac{1 \times 3}{7 \times 5} = \frac{3}{35}$

3. Multiply.

$$\text{a) } \frac{1}{3} \times 2\frac{2}{5} = \frac{1}{3} \times \frac{12}{5} = \frac{12}{15}$$

$$\text{b) } 1\frac{1}{6} \times \frac{3}{7} = \frac{\cancel{7}^1}{6_2} \times \frac{\cancel{3}^1}{7_1} = \frac{1}{2}$$

$$\text{c) } 4\frac{1}{5} \times 2\frac{2}{3} = \frac{\cancel{21}^7}{5} \times \frac{\cancel{8}_4}{\cancel{3}_1} = \frac{56}{5}$$

$$\text{d) } 1\frac{3}{4} \times 2\frac{3}{14} = \frac{\cancel{7}^1}{4} \times \frac{\cancel{31}_{14_2}}{\cancel{14}_2} = \frac{31}{8}$$

4. Divide.

$$\text{a) } \frac{4}{7} \div \frac{1}{2} = \frac{4}{7} \times \frac{2}{1} = \frac{8}{7}$$

$$\text{b) } \frac{4}{9} \div \frac{2}{3} = \frac{\cancel{4}_2}{9_3} \times \frac{\cancel{3}^1}{\cancel{2}_1} = \frac{2}{3}$$

$$\text{c) } \frac{5}{12} \div \frac{3}{10} = \frac{\cancel{5}_5}{\cancel{12}_6} \times \frac{\cancel{10}^5}{\cancel{3}_1} = \frac{25}{18}$$

$$\text{d) } \frac{2}{3} \div \frac{7}{15} = \frac{\cancel{2}_2}{\cancel{3}_3} \times \frac{\cancel{15}^5}{\cancel{7}_7} = \frac{10}{7}$$

5. Divide.

$$\text{a) } 1\frac{1}{4} \div \frac{4}{5} = \frac{5}{4} \div \frac{4}{5} = \frac{5}{4} \times \frac{5}{4} = \frac{25}{16}$$

$$\text{b) } 2\frac{7}{8} \div \frac{3}{4} = \frac{23}{8} \div \frac{3}{4} = \frac{23}{8} \times \frac{\cancel{4}^1}{\cancel{3}_1} = \frac{23}{6}$$

$$\text{c) } 3\frac{1}{5} \div 2\frac{2}{3} = \frac{16}{5} \div \frac{8}{3} = \frac{\cancel{16}^8}{\cancel{5}_5} \times \frac{\cancel{3}_3}{\cancel{8}_1} = \frac{6}{5}$$

$$\text{d) } 1\frac{2}{9} \div 7\frac{1}{3} = \frac{11}{9} \div \frac{22}{3} = \frac{\cancel{11}_3}{\cancel{9}_3} \times \frac{\cancel{3}^1}{\cancel{22}_2} = \frac{1}{6}$$

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?

$$\frac{3}{8} \text{ of } \frac{2}{3} = \frac{\cancel{3}_3}{8_4} \times \frac{\cancel{2}^1}{\cancel{3}_1} = \frac{1}{4}$$

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



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

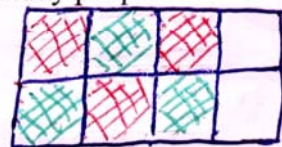
7. A bowl of strawberries is $\frac{3}{4}$ full. Janice

and her friends had each eaten $\frac{1}{8}$ of a

bowl of strawberries. How many people ate strawberries?

$$\frac{3}{4} \div \frac{1}{8} = \frac{3}{4} \times \frac{\cancel{8}^2}{\cancel{1}_1} = \frac{6}{1} = 6$$

Six people ate strawberries.



Practise

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

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

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

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

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

2. Find each sum.

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

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

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

3. Find each sum.

$$\begin{aligned} \text{a) } \frac{2}{3} + \frac{3}{5} &= \frac{10}{15} + \frac{9}{15} \\ &= \frac{19}{15} \end{aligned}$$

$$\begin{aligned} \text{b) } \frac{5}{6} + \frac{3}{7} &= \frac{35}{42} + \frac{18}{42} \\ &= \frac{53}{42} \end{aligned}$$

$$\begin{aligned} \text{c) } \frac{2}{9} + \frac{5}{12} &= \frac{8}{36} + \frac{15}{36} \\ &= \frac{23}{36} \end{aligned}$$

4. Find each difference.

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

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

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

5. Find each difference.

$$\begin{aligned} \text{a) } 3\frac{2}{7} - 2\frac{1}{2} &= \frac{23}{7} - \frac{5}{2} \\ &= \frac{46}{14} - \frac{35}{14} = \frac{11}{14} \end{aligned}$$

$$\begin{aligned} \text{b) } 1\frac{5}{9} - \frac{3}{5} &= \frac{14}{9} - \frac{3}{5} \\ &= \frac{70}{45} - \frac{27}{45} = \frac{43}{45} \end{aligned}$$

$$\begin{aligned} \text{c) } 2\frac{2}{5} - 1\frac{1}{3} &= \frac{12}{5} - \frac{4}{3} \\ &= \frac{36}{15} - \frac{20}{15} = \frac{16}{15} \end{aligned}$$

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.

$$\begin{aligned} 2\frac{1}{2} + 1\frac{3}{4} + 2\frac{5}{6} &= \frac{5}{2} + \frac{7}{4} + \frac{17}{6} \\ &= \frac{30}{12} + \frac{21}{12} + \frac{34}{12} \\ &= \frac{85}{12} = 7\frac{1}{12} \text{ hours} \end{aligned}$$

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

$$\begin{aligned} 2\frac{5}{6} - 1\frac{3}{4} &= \frac{17}{6} - \frac{7}{4} = \frac{34}{12} - \frac{21}{12} \\ &= \frac{13}{12} = 1\frac{1}{12} \text{ hours.} \end{aligned}$$

Substituting into Algebraic Expressions

Substitute and evaluate.

1. $8w - 11$

for $w = 9$

$$\begin{aligned} 8w - 11 \\ = 8(9) - 11 \\ = 72 - 11 \\ = 61 \end{aligned}$$

2. $b \div 4 - 6$

for $b = 32$

$$\begin{aligned} b \div 4 - 6 \\ = 32 \div 4 - 6 \\ = 8 - 6 \\ = 2 \end{aligned}$$

3. $7v + 34$

for $v = 8$

$$\begin{aligned} 7v + 34 \\ = 7(8) + 34 \\ = 56 + 34 \\ = 90 \end{aligned}$$

4. $5k$

for $k = 4$

$$\begin{aligned} 5k \\ = 5(4) \\ = 20 \end{aligned}$$

5. $9e$

for $e = 2$

$$\begin{aligned} 9e \\ = 9(2) \\ = 18 \end{aligned}$$

6. $\frac{d}{6} + 28$

for $d = 36$

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

7. $2n + 31$

for $n = 6$

$$\begin{aligned} 2n + 31 \\ = 2(6) + 31 \\ = 12 + 31 \\ = 42 \end{aligned}$$

8. $6c - 21$

for $c = 4$

$$\begin{aligned} 6c - 21 \\ = 6(4) - 21 \\ = 24 - 21 \\ = 3 \end{aligned}$$

9. $4z + 8$

for $z = 8$

$$\begin{aligned} 4z + 8 \\ = 4(8) + 8 \\ = 32 + 8 \\ = 40 \end{aligned}$$

10. $8x$

for $x = 2$

$$\begin{aligned} 8x \\ = 8(2) \\ = 16 \end{aligned}$$

11. $5t - 10$

for $t = 7$

$$\begin{aligned} 5t - 10 \\ = 5(7) - 10 \\ = 35 - 10 \\ = 25 \end{aligned}$$

12. $f \div 5 + 16$

for $f = 35$

$$\begin{aligned} f \div 5 + 16 \\ = 35 \div 5 + 16 \\ = 7 + 16 = 23 \end{aligned}$$

13. $\frac{j}{2} + j$

for $j = 6$

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

14. $9u$

for $u = 3$

$$\begin{aligned} 9u \\ = 9(3) \\ = 27 \end{aligned}$$

15. $3k + 50$

for $k = 2$

$$\begin{aligned} 3k + 50 \\ = 3(2) + 50 \\ = 6 + 50 \\ = 56 \end{aligned}$$

16. $2s$

for $s = 7$

$$\begin{aligned} 2s \\ = 2(7) \\ = 14 \end{aligned}$$

17. $m \div 8 - 2$

for $m = 32$

$$\begin{aligned} m \div 8 - 2 \\ = 32 \div 8 - 2 \\ = 4 - 2 \\ = 2 \end{aligned}$$

18. $6t - 24$

for $t = 5$

$$\begin{aligned} 6t - 24 \\ = 6(5) - 24 \\ = 30 - 24 \\ = 6 \end{aligned}$$

19. $7g + 41$

for $g = 9$

$$\begin{aligned} 7g + 41 \\ = 7(9) + 41 \\ = 63 + 41 \\ = 104 \end{aligned}$$

20. $5y - 7$

for $y = 3$

$$\begin{aligned} 5y - 7 \\ = 5(3) - 7 \\ = 15 - 7 \\ = 8 \end{aligned}$$

Solving Equations

Solve each equation.

1. $83 + t = 139$

$$\begin{aligned}\therefore 83 + t - 83 &= 139 - 83 \\ \therefore t &= 56\end{aligned}$$

2. $s + 12 = 70$

$$\begin{aligned}\therefore s + 12 - 12 &= 70 - 12 \\ \therefore s &= 58\end{aligned}$$

3. $91 = q + 19$

$$\begin{aligned}\therefore 91 - 19 &= q + 19 - 19 \\ \therefore 72 &= q\end{aligned}$$

4. $104 = 74 + x$

$$\begin{aligned}\therefore 104 - 74 &= 74 + x - 74 \\ \therefore 30 &= x\end{aligned}$$

5. $f - 45 = 13$

$$\begin{aligned}\therefore f - 45 + 45 &= 13 + 45 \\ \therefore f &= 58\end{aligned}$$

6. $76 - y = 4$

$$\begin{aligned}\therefore 76 - y - 76 &= 4 - 76 \\ \therefore -y &= -72 \\ \therefore y &= 72\end{aligned}$$

7. $4 = w - 31$

$$\begin{aligned}\therefore 4 + 31 &= w - 31 + 31 \\ \therefore 35 &= w\end{aligned}$$

8. $1 = 55 - z$

$$\begin{aligned}\therefore 1 - 55 &= 55 - z - 55 \\ \therefore -54 &= -z \\ \therefore 54 &= z\end{aligned}$$

9. $95 + c = 123$

$$\begin{aligned}\therefore 95 + c - 95 &= 123 - 95 \\ \therefore c &= 28\end{aligned}$$

10. $162 = 86 + j$

$$\begin{aligned}\therefore 162 - 86 &= 86 + j - 86 \\ \therefore 76 &= j\end{aligned}$$

11. $v + 63 = 80$

$$\begin{aligned}\therefore v + 63 - 63 &= 80 - 63 \\ \therefore v &= 17\end{aligned}$$

12. $58 = 35 + r$

$$\begin{aligned}\therefore 58 - 35 &= 35 + r - 35 \\ \therefore 23 &= r\end{aligned}$$

13. $63 = 66 - b$

$$\begin{aligned}\therefore 63 - 66 &= 66 - b - 66 \\ \therefore -3 &= -b \\ \therefore 3 &= b\end{aligned}$$

14. $25 = x - 17$

$$\begin{aligned}\therefore 25 + 17 &= x - 17 + 17 \\ \therefore 42 &= x\end{aligned}$$

15. $79 - g = 22$

$$\begin{aligned}\therefore 79 - g - 79 &= 22 - 79 \\ \therefore -g &= -57 \\ \therefore g &= 57\end{aligned}$$

16. $w - 18 = 13$

$$\begin{aligned}\therefore w - 18 + 18 &= 13 + 18 \\ \therefore w &= 31\end{aligned}$$

17. $92 = 18 + e$

$$\begin{aligned}\therefore 92 - 18 &= 18 + e - 18 \\ \therefore 74 &= e\end{aligned}$$

18. $58 = p + 20$

$$\begin{aligned}\therefore 58 - 20 &= p + 20 - 20 \\ \therefore 38 &= p\end{aligned}$$

19. $77 = 62 + q$

$$\begin{aligned}\therefore 77 - 62 &= 62 + q - 62 \\ \therefore 15 &= q\end{aligned}$$

20. $28 + h = 110$

$$\begin{aligned}\therefore 28 + h - 28 &= 110 - 28 \\ \therefore h &= 82\end{aligned}$$

21. $z - 24 = 72$

$$\begin{aligned}\therefore z - 24 + 24 &= 72 + 24 \\ \therefore z &= 96\end{aligned}$$

22. $59 = c - 13$

$$\begin{aligned}\therefore 59 + 13 &= c - 13 + 13 \\ \therefore 72 &= c\end{aligned}$$

23. $65 - p = 59$

$$\begin{aligned}\therefore 65 - p - 65 &= 59 - 65 \\ \therefore -p &= -6 \\ \therefore p &= 6\end{aligned}$$

24. $26 = 81 - j$

$$\begin{aligned}\therefore 26 - 81 &= 81 - j - 81 \\ \therefore -55 &= -j \\ \therefore 55 &= j\end{aligned}$$

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

$= \frac{3}{7} \times \frac{5}{6}$

$= \frac{5}{14}$

4. Find 15% of 65.

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

5. Solve for unknown.

[2] $3x - 1 = 8$

$3x - 1 + 1 = 8 + 1$

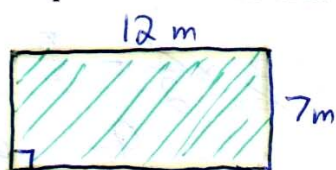
$3x = 9$

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

$x = 3$

6. Find the **perimeter** and the **area** of a rectangle with dimensions 12m x 7m.

[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

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

3 numbers
in a rowadd up
to 12multiply
to 60

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

$3x + 3 = 12$

$3x + 3 - 3 = 12 - 3$

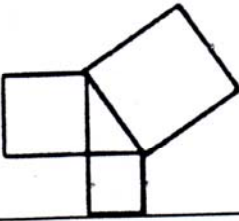
$3x = 9$

$x = 3$

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

Check: $3+4+5 = 12$
 $3(4)(5) = 12(5) = 60$

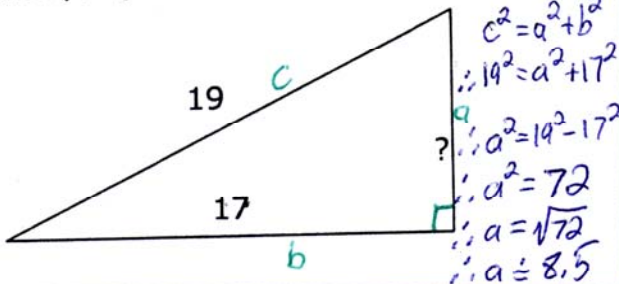
The Pythagorean Theorem



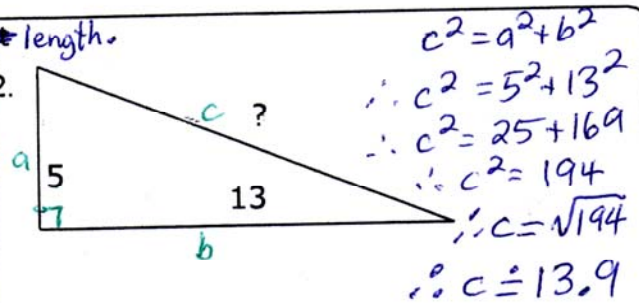
The theorem states that the square of the hypotenuse is the sum of the squares of the legs. Always understand that the Pythagorean Theorem relates the areas of squares on the sides of the right triangle.

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

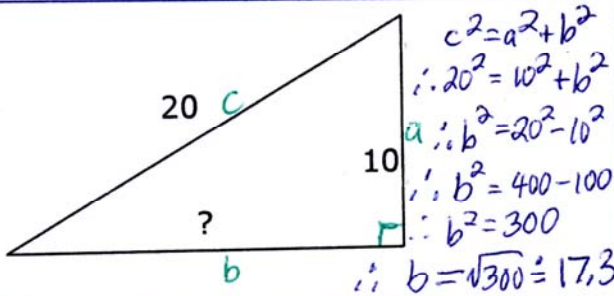
1.



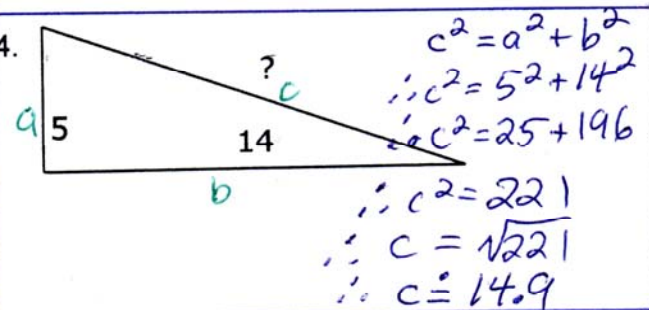
2.



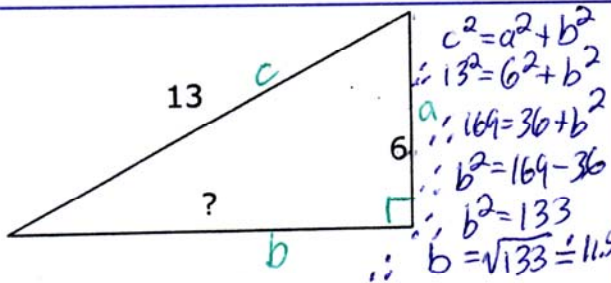
3.



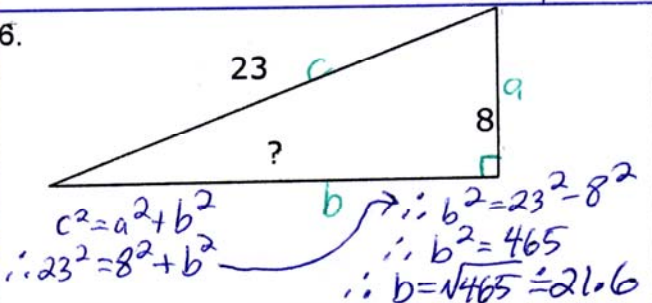
4.



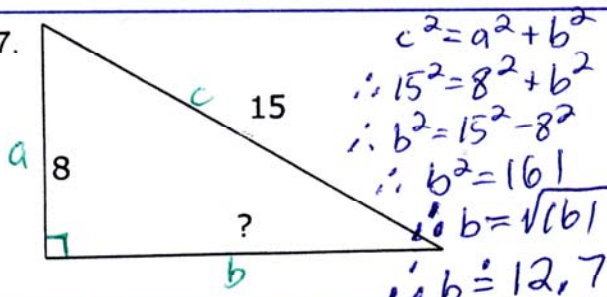
5.



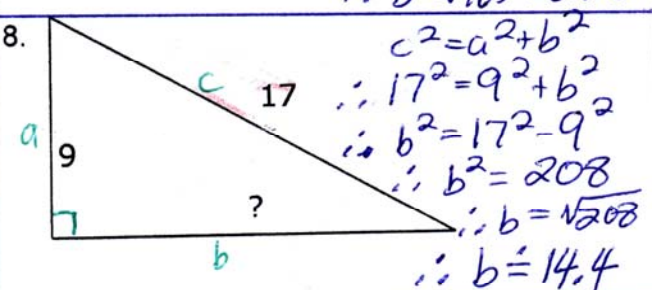
6.



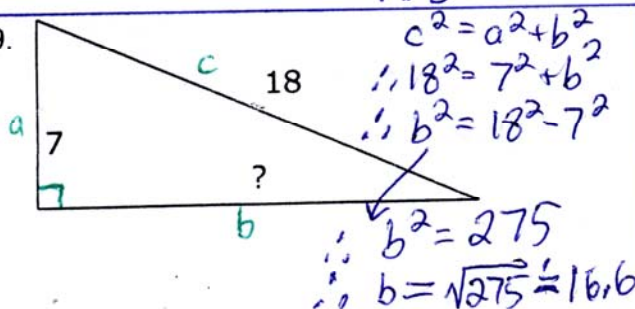
7.



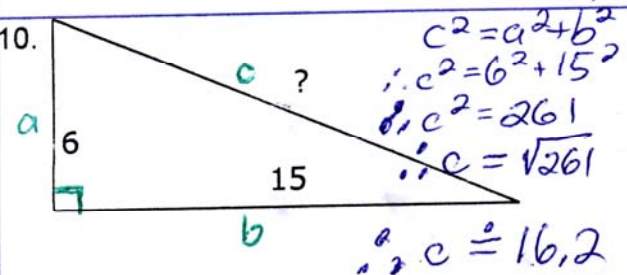
8.



9.



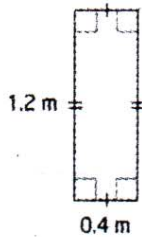
10.



Practise

1. Determine the area of each shape.

a)



rectangle

$$A = lw \\ = (1.2 \text{ m})(0.4 \text{ m}) \\ = 0.48 \text{ m}^2$$

b)

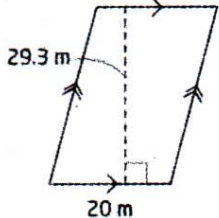


square

$$A = lw \\ = 5.2(5.2) \\ = 27.04 \text{ cm}^2$$

2. Determine the area of each shape.

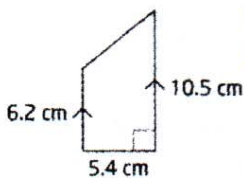
a)



parallelogram

$$A = bh \\ = 20(29.3) \\ = 586 \text{ m}^2$$

b)

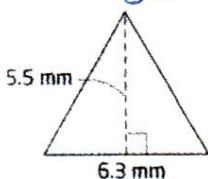


trapezoid
(turn paper sideways)

$$A = \frac{h(a+b)}{2} \\ = \frac{5.4(6.2+10.5)}{2} = 45.09 \text{ cm}^2$$

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

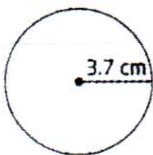
a)



triangle

$$A = \frac{bh}{2} \\ = \frac{6.3(5.5)}{2} \\ = 17.3 \text{ mm}^2 \\ \text{(to the nearest tenth)}$$

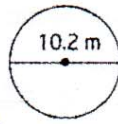
b)



$$A = \pi r^2 \\ \approx 3.14(3.7)^2 \\ = 3.14(13.69) \\ \approx 42.0 \text{ cm}^2 \\ \text{(to the nearest tenth)}$$

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

a)



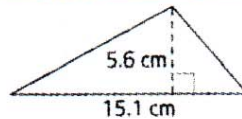
circle

$$A = \pi r^2 \\ \approx 3.14(5.1)^2 \\ = 81.6714 \text{ m}^2$$

$$d = 10.2 \text{ m}$$

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

b)

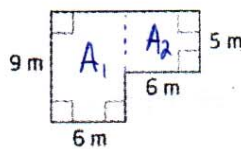


triangle $A = \frac{bh}{2}$

$$= \frac{5.6(15.1)}{2} \\ = 42.28 \text{ cm}^2$$

5. Determine the area of each shape.

a)



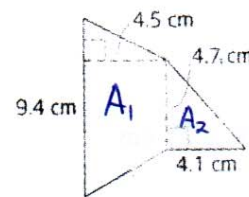
$$A = A_1 + A_2 \\ = 9(6) + 6(5) \\ = 54 + 30 \\ = 84 \text{ m}^2$$

b)



$$A = A_1 + A_2 \\ = bh + lw \\ = 62(44) + 62(62) \\ = 2728 + 3844 \\ = 6572 \text{ mm}^2$$

c)

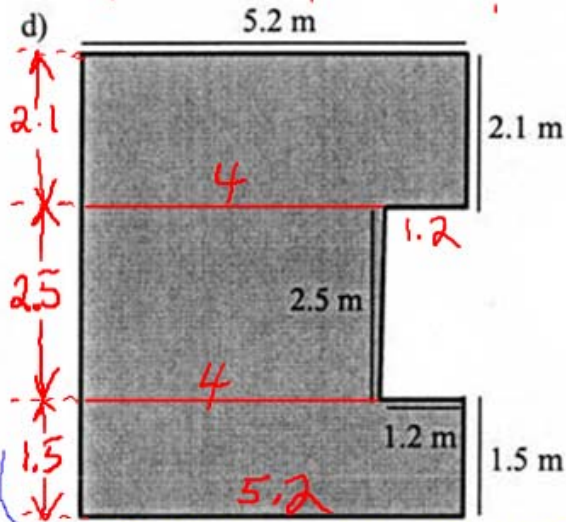
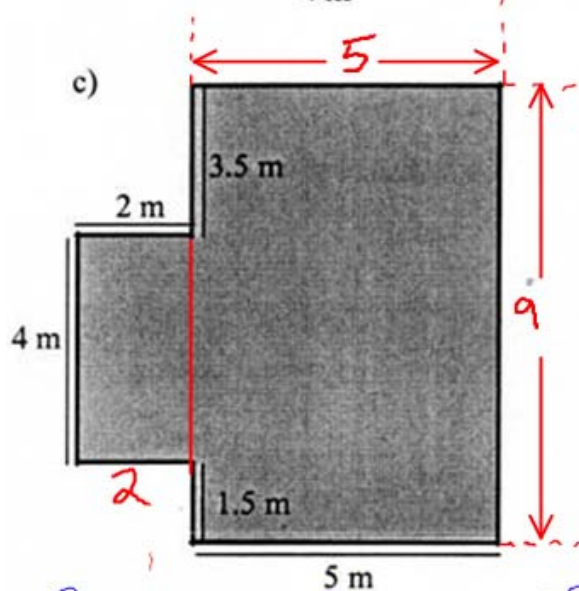
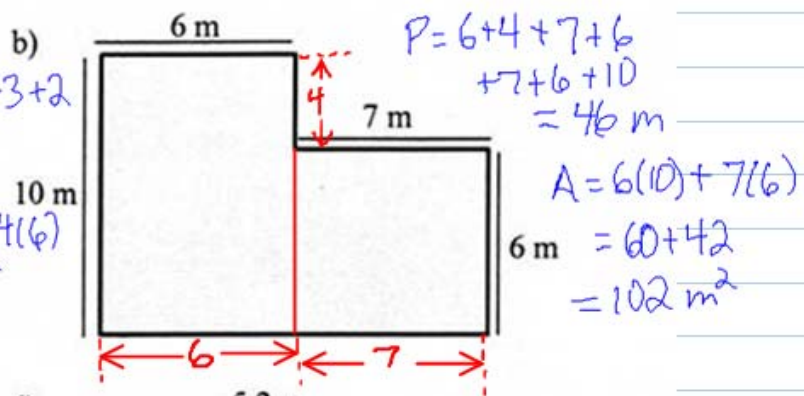
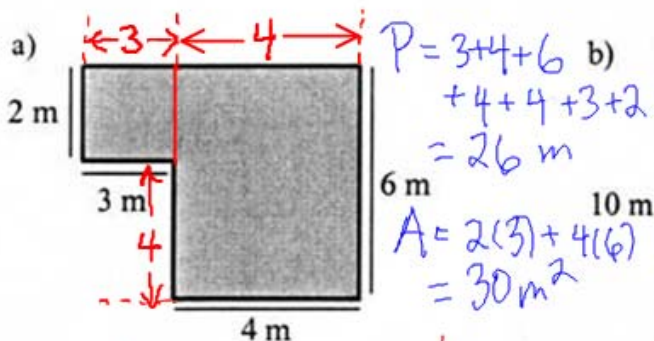


$$A = A_1 + A_2 \\ = \frac{h(a+b)}{2} + \frac{bh}{2} \\ = \frac{4.5(4.7+9.4)}{2} + \frac{4.1(4.7)}{2} \\ = 31.725 + 9.635 \\ = 41.36 \\ \approx 41.4 \text{ cm}^2 \\ \text{(to the nearest tenth)}$$

A_1 - trapezoid

A_2 - triangle

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



6 Find the perimeter and area of each shape.

