N10 Factors

1) Write down all the factors of:

a) 6

b) 8

c) 10

d) 12

e) 20

f) 21

2) 100 has nine factors.

What are they?

3) The numbers 2, 3, 5 and 7 all have exactly two factors.

Find the next four numbers with only two factors.

---

4) The numbers 1, 4, 9 and 16 all have an odd number of factors.

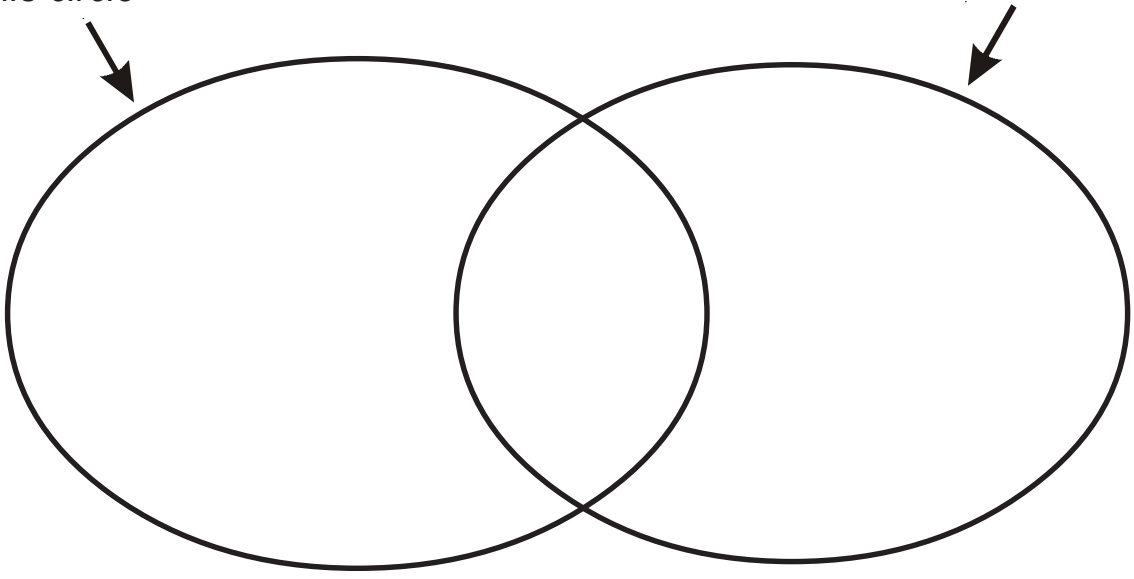
Find the next three numbers which have an odd number of factors.

---

5) Put the correct numbers in the circles.
Be careful of the overlaps.

Factors of 24 in this circle

Factors of 40 in this circle



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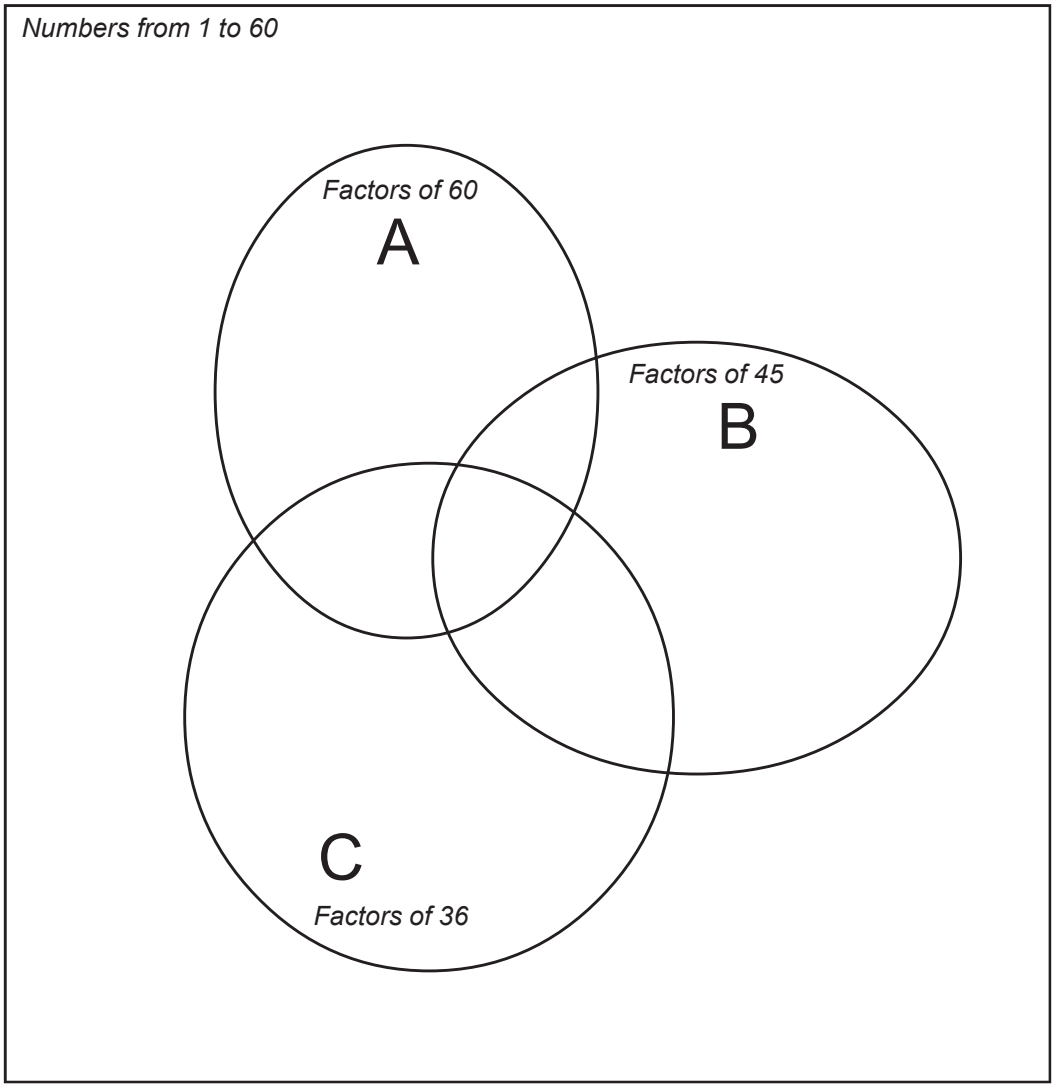
N10 Factors

Place all the whole numbers from 1 to 60 in the diagram below.
However, you must stick to these four rules:

1) In the rectangle you must have every whole number from 1 to 60
2) In circle A you must have all the factors of 60
3) In circle B you must have all the factors of 45
4) In circle C you must have all the factors of 36



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N11 Multiples

1) a) Write down the first five multiples of 3.

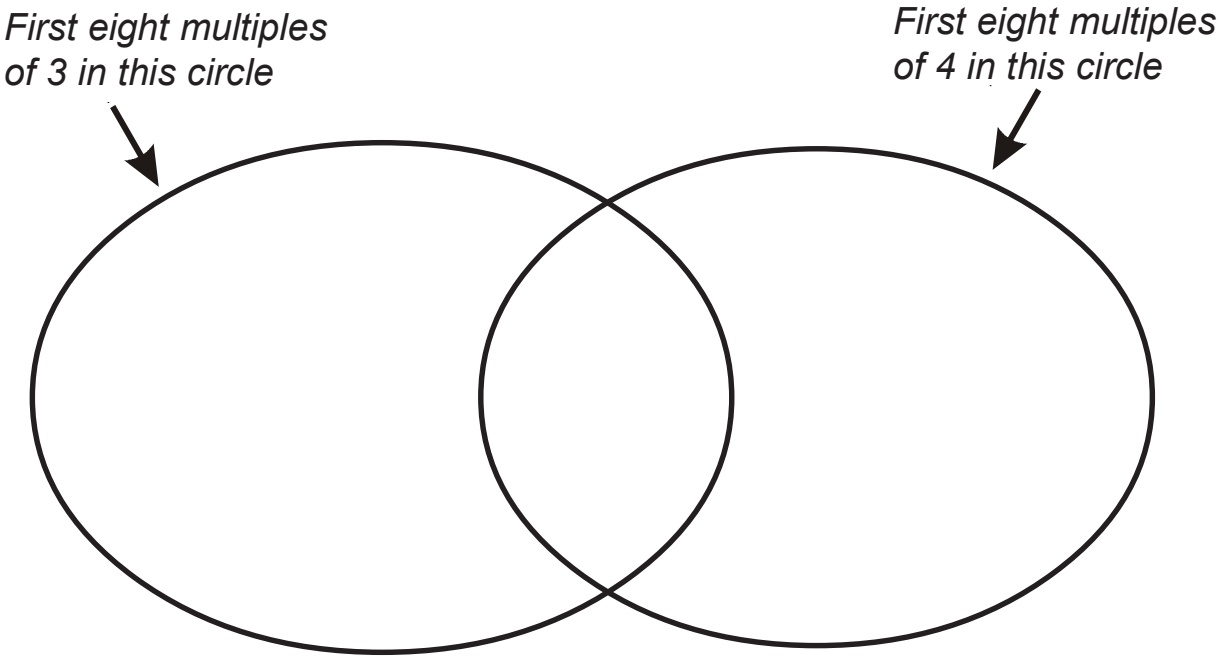
b) Write down the first five multiples of 7.

c) Write down the first five multiples of 4.

2) 6, 12, 18, 24, 30 are the first five multiples of which number?

3) What are the eighth, ninth and tenth multiples of 11?

4) Put the correct numbers in these circles.
Be careful of the overlaps.



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N12 Number Patterns

Example

3, 5, 7, 9, 11, 13, ?, ?, ?

a) Describe the number pattern. *It goes up in 2s*

b) What are the next three terms? *15, 17, 19*

1) For each number pattern:

   a) Describe the pattern

   b) Work out what the next three terms are

      (i) 2, 4, 6, 8, 10, 12, ?, ?, ?

      (ii) 1, 4, 7, 10, 13, 16, ?, ?, ?

      (iii) 5, 12, 19, 26, 33, 40, ?, ?, ?

      (iv) -2, 3, 8, 13, 18, 23, ?, ?, ?

      (v) 36, 33, 30, 27, 24, 21, ?, ?, ?

      (vi) -12, -8, -4, 0, 4, 8, ?, ?, ?

      (vii) 100, 91, 82, 73, 64, 55, ?, ?, ?

      (viii) 7, 8.5, 10, 11.5, 13, 14.5, ?, ?, ?

2) For both of the following number patterns:

   a) Describe the pattern

   b) Work out what the next three terms are

      (i) 1, 4, 9, 16, 25, 36, ?, ?, ?

      (ii) 1, 3, 6, 10, 15, 21, ?, ?, ?

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N12 Number Patterns

1) Work out the next two terms for each of the following number patterns:

a) 3, 8, 15, 24, 35, ?, ?

b) 4, 14, 36, 76, 140, ?, ?

2) Work out the next two terms for each of the following number patterns:

a) 1, 2, 4, 8, 16, 32, ?, ?

b) 2, 7, 22, 67, 202, ?, ?

3) Work out the next two terms for each of the following number patterns:

a) 1, 1, 2, 3, 5, 8, 13, 21, ?, ?

b) 1, 2, 3, 6, 11, 20, 37, 68, ?, ?

4) Work out the next two terms for each of the following :

a) O, T, T, F, F, S, S, ?, ?

b) J, F, M, A, M, J, J, ?, ?

5) Choose any number between 1 and 20.

If your number is even, halve it and write down the answer.
If your number is odd, multiply it by three and add one. Write down the answer.

Look at your answer and follow the same rules:
If it is even you halve it and write down the answer.
If it is odd you multiply by three and add one and write down the answer.

Only stop when you get to one.

Try more starting numbers (of any size).

Do they all go to one?

What about if you use 27 as the number to start with?

---

6) This number pattern begins with a 1.
After that, every row can be worked out from the row above it.
Can you work out the rule and find out what the question marks should be in the last row?

This is a very difficult question and not many succeed.

1
1 1
2 1
1 2 1 1
1 1 1 2 2 1
3 1 2 2 1 1
1 3 1 1 2 2 2 1
1 1 1 3 2 1 3 2 1 1
3 1 1 3 1 2 1 1 1 3 1 2 2 1
? ? ?

N15a Short Multiplication Integers

1) $3 \times 13 =$ _____

2) $55 \times 4 =$ _____

3) $9 \times 64 =$ _____

4) $92 \times 5 =$ _____

5) $7 \times 87 =$ _____

6) $342 \times 8 =$ _____

7) $6 \times 208 =$ _____

8) $745 \times 4 =$ _____

9) $289 \times 7 =$ _____

10) $113 \times 9 =$ _____

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N15b Short Multiplication Decimals

1) $4 \times 1.2 =$ _____

2) $6.5 \times 3 =$ _____

3) $9 \times 18.7 =$ _____

4) $3.6 \times 5 =$ _____

5) $7 \times 8.2 =$ _____

6) $6 \times 1.39 =$ _____

7) $9.2 \times 8 =$ _____

8) $8.35 \times 4 =$ _____

9) $3.62 \times 7 =$ _____

10) $25.3 \times 9 =$ _____

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N16 Short Division of Integers

1) 786 ÷ 2 = _____

2) 465 ÷ 5 = _____

3) 448 ÷ 8 = _____

4) 552 ÷ 6 = _____

5) 801 ÷ 9 = _____

6) 5976 ÷ 8 = _____

7) 9080 ÷ 5 = _____

8) 17801 ÷ 7 = _____

9) 18054 ÷ 6 = _____

10) 374877 ÷ 9 = _____

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N17a Multiplying and Dividing by powers of 10 - Integers

1) $75 \times 100 =$ _____

2) $102 \times 10 =$ _____

3) $9 \times 1000 =$ _____

4) $450 \div 10 =$ _____

5) $3800 \div 10 =$ _____

6) $9700 \div 100 =$ _____

7) $60 \times 1000 =$ _____

8) $7000 \div 100 =$ _____

9) $210 \times 1000 =$ _____

10) $1050000 \div 1000 =$ _____

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N17b Multiplying and Dividing by powers of 10 - Decimals

1) $3.6 \times 10 =$ _____

2) $82.9 \times 100 =$ _____

3) $0.5 \times 1000 =$ _____

4) $47 \div 10 =$ _____

5) $106.4 \div 10 =$ _____

6) $9.9 \div 100 =$ _____

7) $6.2 \times 1000 =$ _____

8) $70 \div 1000 =$ _____

9) $0.035 \times 10000 =$ _____

10) $0.01 \div 100 =$ _____

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N17b Multiplying and Dividing by powers of 10 - Decimals

1) Fill in the missing box in each case.

a) 12 → ×100 → ☐

b) 7.5 → ÷10 → ☐

c) 83.1 → ☐ → 8310

d) 0.9 → ☐ → 900

e) 662 → ☐ → 66.2

f) 540 → ☐ → 5.4

g) 0.6 → ☐ → 0.006

h) ☐ → ÷100 → 73.7

i) ☐ → ×10 → 0.18

j) ☐ → ×1000 → 104

2) Using the fact below:

$$365 \times 17 = 6205$$

Work out the following

a) $36.5 \times 17 =$ ____

b) $36.5 \times 1.7 =$ ____

c) $365 \times 170 =$ ____

d) $3650 \times 1.7 =$ ____

e) $62.05 \div 17 =$ ____

f) $6.205 \div 36.5 =$ ____

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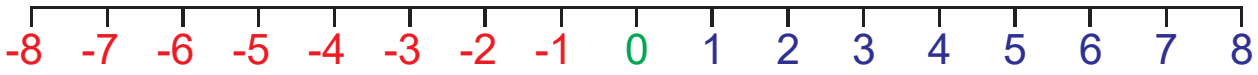
N19a Directed Numbers Addition and Subtraction



1) The temperature is 3°C at midnight and then falls 8 degrees by 6 a.m.

   What is the temperature at 6 a.m?

2) Tim has only £8 in his bank account but writes a cheque for £15.

   If the cheque is cashed, how much will Tim have in his account?

3) Sue owes £7 to one friend and £6 to another friend.

   She writes this in her diary as (-7) + (-6)

   a) How much does she owe altogether?

   b) What is (-7) + (-6)?

4) Sue still owes £7 to one friend and £6 to another friend but her mother decides to take away the £6 debt by paying it off.

   Sue writes this as (-7) + (-6) – (-6)

   a) How much does Sue owe now?

   b) What is (-7) + (-6) – (-6)?

5) Work out the answers to

   a) 6 – 14

   b) 2 – 12

   c) -1 – 6

   d) -3 – 5

   e) -7 – 15

6) Work out the answers to

   a) 2 – (-3)

   b) 6 – (-5)

   c) -3 – (-6)

   d) -7 – (-2)

   e) -20 – (-18)

7) Work out the answers to

   a) 5 + (-2)

   b) 8 + (-6)

   c) 3 + (-8)

   d) -4 + (-3)

   e) -8 + (-4)

8) Work out the answers to

   a) 4 – (+1)

   b) 7 – (+5)

   c) 1 – (+3)

   d) -6 – (+1)

   e) -1 – (+6)

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N19b Directed Numbers Multiplication and Division

1) a) $5 \times -7 =$

b) $-3 \times 6 =$

c) $-4 \times -8 =$

d) $2.5 \times -2 =$

e) $-4 \times -1.5 =$

2) a) $3 \times 2 \times -7 =$

b) $-5 \times -4 \times 3 =$

c) $9 \times 2 \times -2 =$

d) $-6 \times -2 \times -3 =$

e) $5 \times -8 \times -1 \times 2 =$

3) a) $8 \div -2 =$

b) $-16 \div 4 =$

c) $-20 \div -5 =$

d) $32 \div -8 =$

e) $-13 \div -2 =$

4) a) $-9 \times 7 \times 2 =$

b) $18 \div -4 =$

c) $-1 \times 2 \times -3 \times 4 \times -5 =$

d) $(24 \div -4) \times -5 =$

e) $(-50 \div 5) \times -2 =$

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N23b Introduction to Fractions Equivalent Fractions

1) Find three equivalent fractions to each of the following:

a) $\frac{1}{3}$ b) $\frac{1}{4}$ c) $\frac{1}{5}$

d) $\frac{2}{5}$ e) $\frac{3}{4}$ f) $\frac{5}{8}$

2) Fill in the missing number in each of these equivalent fractions.

a) $\frac{2}{3} = \frac{\square}{9}$ b) $\frac{1}{5} = \frac{\square}{20}$ c) $\frac{3}{11} = \frac{\square}{22}$

d) $\frac{1}{3} = \frac{5}{\square}$ e) $\frac{2}{7} = \frac{10}{\square}$ f) $\frac{4}{9} = \frac{8}{\square}$

g) $\frac{2}{5} = \frac{\square}{50}$ h) $\frac{5}{7} = \frac{\square}{42}$ i) $\frac{9}{10} = \frac{81}{\square}$

3) Complete the following equivalent fraction series.

a) $\frac{1}{2} = \frac{2}{\square} = \frac{\square}{6} = \frac{5}{\square} = \frac{\square}{20} = \frac{50}{\square}$

b) $\frac{3}{5} = \frac{6}{\square} = \frac{\square}{15} = \frac{12}{\square} = \frac{\square}{50} = \frac{300}{\square}$

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N24b Percentages
Percentage of an Amount

1) Work out the following:

a) 50% of 80

b) 50% of 48

c) 50% of 15

d) 25% of 120

e) 25% of 90

2) Work out the following:

a) 10% of 150

b) 10% of 26

c) 50% of 12

d) 25% of 12

e) 75% of 12

3) Work out the following:

a) 10% of £40

b) 5% of £40

c) 15% of £40

d) 5% of £70

e) 15% of £380

4) Work out the following:

a) 20% of £50

b) 45% of £9

c) 80% of £11

d) 35% of £6

e) 65% of £824

5) Jamie received £26 pocket money last week.

He spent it as follows: __ 10% on sweets,

__ 25% on magazines

__ 15% on games

How much did Jamie have left?
Show your working.

6) Tony had £40 saved up and gave 35% of it to his younger sister, Ella.

Ella gave 20% of what she was given to her younger brother, Ben.

Ben gave 30% of what he was given to his younger brother, Tim.

Tim spent 75% of what he was given on buying a toy for his hamster, Hammy.

How much was the toy for Hammy?

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N26 Function Machines and Inverse Operations

1) Find the **output** for each of these function machines.

a) 3 → × 5 →

b) 7 → + 5 →

c) 6 → × 2 → – 3

d) 13 → + 5 → ÷ 3

e) 10 → ÷ 2 → – 7

f) 7 → – 4 → × 2.5

2) Find the **input** for each of these function machines.

a) → – 5 → 8

b) → ÷ 4 → 25

c) → × 2 → – 1 → 19

d) → ÷ 5 → + 8 → 18

e) → – 7 → ÷ 2 → 3.5

f) → × 19 → – 4 → -4

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A6 Collecting Like Terms

1) Simplify these expressions

a) $3a + 4a =$

b) $b + 4b =$

c) $5x - x =$

d) $6d + 3d - 2d =$

e) $2k + k + k - 3k =$

f) $3r - 2r + 4r =$

g) $5t - 3t + t + 2t =$

h) $7p - p + 2p - 5p =$

i) $-4y + 2y - y + 4y =$

j) $-2c + c - 3c - c =$

2) Simplify these expressions

a) $a + b + a + b =$

b) $3a + 2a + 4b + b =$

c) $7x + 2y + x + 3y =$

d) $5r + 6p - 2r - 3p =$

e) $4c + 8d - 3c + d =$

f) $6x - 4y + 7y - 2x =$

g) $2k - 3l - k + 10l =$

h) $3m + 5n + 7m - 7n =$

i) $v - 4w - 5v - 2w =$

j) $-3x - y - 3y - x =$

3) Simplify these expressions

a) $7xy - 2xy =$

b) $5cd + 3dc =$

c) $x^2 + 4x^2 + 2x^2 =$

d) $9y^3 + y - 2y^3 =$

e) $3ab + 7ab - 2a =$

f) $6m + 2pr - m + 3rp =$

g) $10a^2d + 2y - 3da^2 + y^2 =$

h) $bz^2 + 4t^3 - 3t^3 - 5zb^2 =$

i) $2r^2b + 5r^2 - r + 6br^2 =$

j) $8x^3y + 2w - 5w - 3yx^3 =$

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A7a Algebraic Simplification Multiplication

1) Simplify the following

a) $6 \times x$

b) $2 \times x \times y$

c) $6 \times x \times 3 \times y$

d) $s \times t \times u$

e) $7 \times s \times 2 \times t \times u$

2) Simplify the following

a) $x \times x \times x \times x$

b) $t \times t \times t \times t \times t \times t \times t$

c) $g \times g$

d) $x \times x \times x \times y \times y \times y \times y$

e) $x \times y \times x \times y \times y$

3) Simplify the following

a) $x \times x^2$

b) $y^3 \times y^4$

c) $x^2 \times x^3 \times x$

d) $g \times g \times g^2 \times g^4$

e) $x^2 \times x^3 \times x^4 \times x^5$

4) Simplify the following

a) $3x^2 \times 2x^3$

b) $5x \times 4x^2$

c) $6y^3 \times 2y^4$

d) $9x^2 \times x^3$

e) $4x^3 \times 2x \times 3x^2$

5) Simplify the following

a) $3x^2y^3 \times 2x^3y^4$

b) $2xy^4 \times 3x^2y$

c) $5x^3y^4 \times 2x^2y^2$

d) $2x^2y \times x^4y^2$

e) $3x^3y \times 2xy^2 \times 3x^2y^2$

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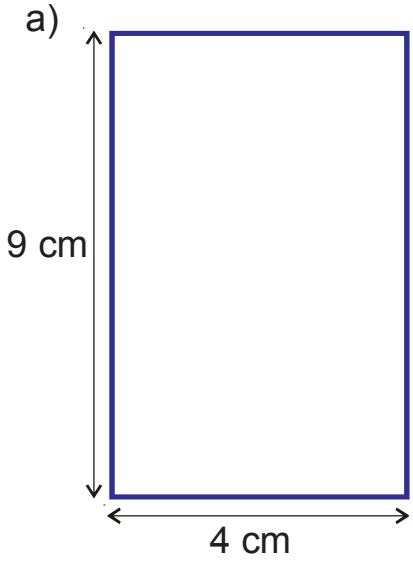
G20a

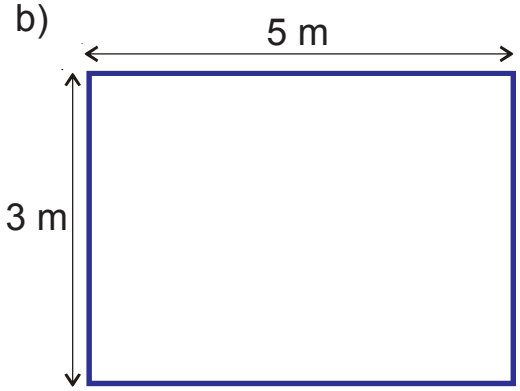
Area - Rectangles

1) Find the areas of the following four rectangles.

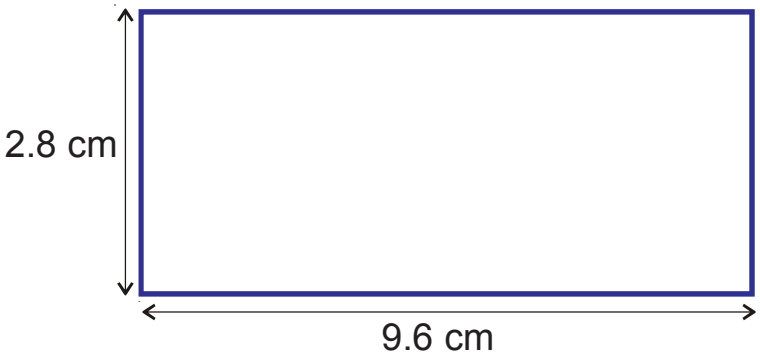
a)



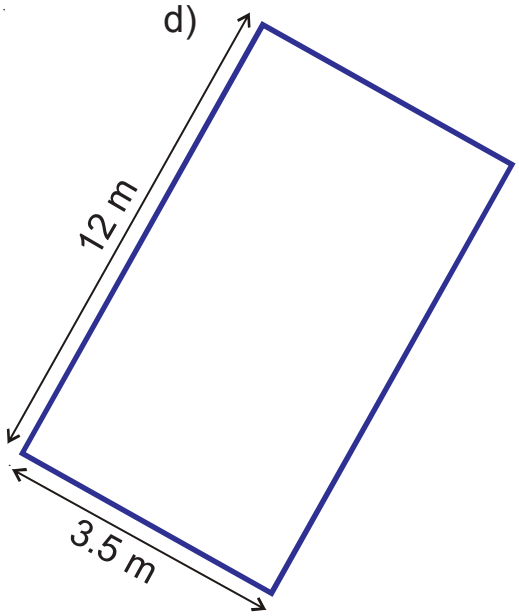
b)



c)

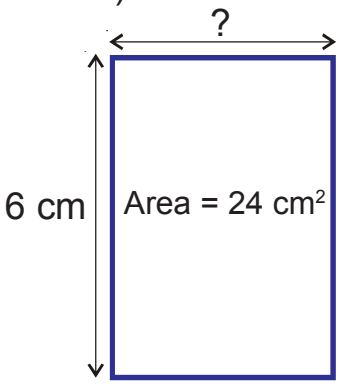


d)

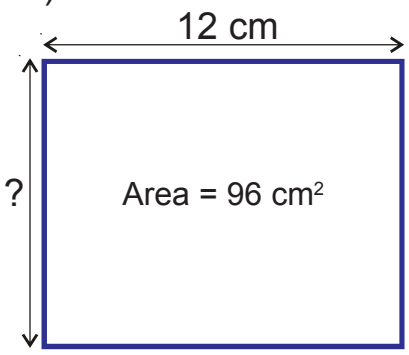


2) Find the lengths of the missing sides.

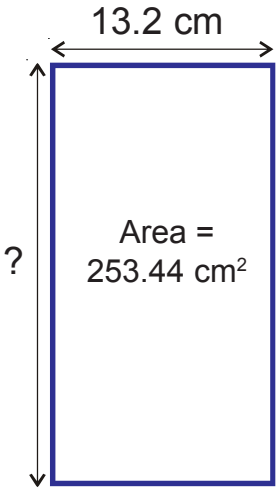
a)



b)



c)



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