Simplification of Fractions

1) Write the following fractions in their simplest forms

a) $\frac{2}{4}$

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

c) $\frac{4}{6}$

d) $\frac{6}{9}$

e) $\frac{12}{15}$

f) $\frac{8}{12}$

g) $\frac{15}{20}$

2) Write the following fractions in their simplest forms

a) $\frac{9}{30}$

b) $\frac{14}{18}$

c) $\frac{7}{49}$

d) $\frac{48}{72}$

e) $\frac{60}{75}$

f) $\frac{15}{27}$

g) $\frac{72}{96}$

Half-Way Values

1) Write down the number which is in the middle of:

a) 3 and 9

b) 12 and 28

c) 11 and 22

d) 17 and 32

e) 72 and 108

f) 1 and 100

g) –6 and 2

2) Write down the number which is in the middle of:

a) 2.4 and 6.8

b) 5.9 and 12.5

c) -5 and 7.8

3) a) 7 is in the middle of 3 and which other number?

b) 16 is in the middle of 9 and which other number?

c) 2.4 is in the middle of 1.1 and which other number?

Factors, Multiples and Primes

1) Write the factors of

a) 6 b) 16 c) 18 d) 30

2) In a pupil's book the factors of 12 are listed as

1 2 3 4 5 12

The above list contains a mistake.

Cross it out from the list and replace it with the correct number.

3) The factors of 30 and 40 are listed

30: 1, 2, 3, 5, 6, 10, 15, 30
40: 1, 2, 4, 5, 8, 10, 20, 40

Write the common factors of 30 and 40 (the numbers that are factors of 30 and 40).

4) Write the first four multiples of

a) 3 b) 5 c) 10 d) 15

5) In a pupil's book the first 7 multiples of 8 are listed as

8 16 22 32 40 48 54

The above list contains 2 mistakes.
Cross them out and replace them with the correct numbers.

6) The first five multiples of 4 and 10 are listed

4: 4, 8, 12, 16, 20
10: 10, 20, 30, 40, 50

From the two lists above, write the common multiple of 4 and 10.

7) List the first five prime numbers

8) Using just this list of numbers:

11 18 1 4 21 24 9 3 12 2 19

find the following:

a) The prime numbers

b) The factors of 18

c) The multiples of 3

Introduction to Powers/Indices

1) Write the following using indices:
eg. $3 \times 3 \times 3 \times 3 = 3^4$

a) $2 \times 2 \times 2 \times 2$

b) $4 \times 4 \times 4$

c) $5 \times 5 \times 5 \times 5 \times 5 \times 5$

d) $12 \times 12 \times 12 \times 12 \times 12$

e) 3.6×3.6

f) $5.2 \times 5.2 \times 5.2$

2) Write each of the following as a single power:
eg. $5^2 \times 5^4 = 5^6$

a) $6^2 \times 6^3$

b) $7^4 \times 7^2$

c) $9^3 \times 9^6$

d) $5^3 \times 5$

e) $2^9 \times 2^3$

f) $7.2^3 \times 7.2^2$

3) Write each of the following as a single power:
eg. $7^5 \div 7^2 = 7^3$

a) $9^5 \div 9^3$

b) $6^9 \div 6^5$

c) $11^7 \div 11^2$

d) $\dfrac{7^8}{7^3}$

e) $\dfrac{3^6}{3}$

f) $\dfrac{8^{15}}{8^4}$

4) Write each of the following as a single power:

eg. $\dfrac{7^3 \times 7^8}{7^6} = \dfrac{7^{11}}{7^6} = 7^5$

a) $\dfrac{4^7 \times 4^3}{4^6}$

b) $\dfrac{9^2 \times 9^6}{9^4}$

5) Match together cards with the same answer

5^7	$5^{10} \div 5^6$	$5^6 \times 5^2$	5^3	5^2
5^8	5×5	$\dfrac{5^2 \times 5^4}{5^3}$	$5^2 \times 5^5$	5^4

Simplifying - Addition and Subtraction

1) Simplify the following

a) $x + x$

b) $2x + 3x$

c) $5t - 3t$

d) $7y - 6y$

e) $x + 2x + 3x$

f) $3g - g + 6g$

g) $2x - 7x + 8x$

h) $y - 2y - 3y + 6y$

2) Simplify the following

a) $xy + 3xy$

b) $5xy - 2xy$

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

d) $3xy^2 - 2xy^2$

e) $2x^2y^3 + 4x^2y^3 - 3x^2y^3$

f) $6a^2bc^4 + 5a^2bc^4 - 2a^2bc^4$

3) Simplify the following

a) $x + y + x + y$

b) $2x + 3y + x + 4y$

c) $2a + 4b - a + 2b$

d) $3x + 4y - x - 2y$

e) $6x - 2y + 2x + 5y$

f) $4x - 3y - 2x - 5y$

g) $3t + 4u + 2t - 7u$

h) $2xy + 3t - xy - 4t$

Simplifying - Multiplication

1) Simplify the following

a) $x \times x$

b) $x \times x \times x \times x \times x$

c) $y \times y \times y$

2) Simplify the following

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

b) $x^3 \times x^5$

c) $y \times y^3$

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

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

3) Simplify the following

a) $2x \times x$

b) $4x \times 3x$

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

d) $4y^2 \times 3y^3$

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

4) Simplify the following

a) $x \times y$

b) $2x \times 3y$

c) $5r \times 2s \times 3t$

d) $6x \times 2y \times z$

5) Simplify the following

a) $3x \times y$

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

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

d) $6xy \times x^2y^3 \times 2y$

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

f) $tu^2 \times t^2u \times 4tu$

Simplifying - Division

1) Simplify the following

a) $x^5 \div x$

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

c) $g^8 \div g^5$

d) $y^4 \div y^2$

e) $x^3 \div x^3$

2) Simplify the following

a) $6x^4 \div x$

b) $12y^5 \div 3y^2$

c) $10g^7 \div 2g^5$

3) Simplify the following

a) $\frac{x^6}{x^2}$

b) $\frac{x^9}{x^4}$

c) $\frac{6x^8}{2x^6}$

4) Simplify the following

a) $\frac{x^6 \times x^3}{x^4}$

b) $\frac{x^3 \times x^4}{x^2 \times x}$

c) $\frac{(x+5)^5}{(x+5)^2}$

5) Simplify the following

a) $20x^6 \div 5x^2$

b) $\frac{14x^7}{2x^2}$

c) $\frac{8x \times 2x^3}{4x^2}$

Simplifying

1) a) Simplify $4p \times 6q$

b) Simplify $d \times d \times d \times d$

c) Simplify $t^9 \div t^4$

2) a) Simplify $4a + 3c - 2a + c$

b) Simplify $2x - 6c - x + 2c$

3) a) Simplify $5xt + 2xt - 4xt$

b) Simplify $4x + 3y - 2x + 4y$

c) Simplify $m \times m \times m$

d) Simplify $3n \times 2t$

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

5) Simplify $4x + 3y - 2x + 6y$

6) a) Simplify $t^4 \times t^5$

b) Simplify $a \times a \times a$

7) a) Simplify $x^6 \times x^2$

b) Simplify $10x^2y^4 \div 2xy^2$

8) a) Simplify $3a + 5c - a + 3c$

b) Simplify $x^3 \times x^4$

c) Simplify $4x^2y^4 \times 5xy^2$

9) Simplify $6x + 8y + 2x - 10y$

10) a) Simplify $x \times x \times x \times x$

b) Simplify $2x \times 3y$

11) a) Simplify $pq + 2pq$

b) Simplify $5x + 3y - x - 4y$

12) a) Simplify $6a + 5b - 3b + a$

b) Simplify $x^4 + x^4$

13) a) Simplify $x + y + x + y + x$

b) Simplify $t^2 + t^2 + t^2$

14) a) Simplify $a^3 \times a^3$

b) Simplify $\dfrac{3x^2y \times 4xy^3}{2xy^2}$

15) a) Simplify $3d + e - d + 4e$

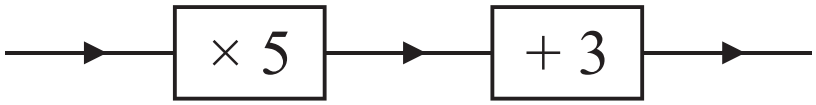
b) Simplify $3x^2 - x^2$

c) Simplify $5t + 8d - 2t - 3d$

d) Simplify $\dfrac{(3x + 1)^3}{(3x + 1)}$

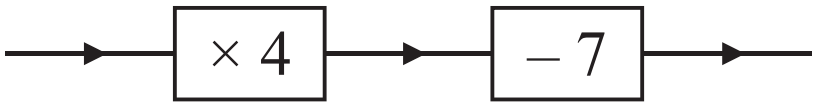
Function Machines

1) Complete the table for the function machine.



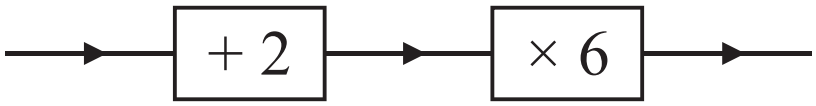
In	Out
4	
7	
	48
	73

2) Complete the table for the function machine.



In	Out
-2	
1	
	17
x	

3) Complete the table for the function machine.



In	Out
-3	
0	
	66
x	

Averages and the Range

1) Kaya made a list of his homework marks.

3 2 3 4 1 4 5 4

a) Write down the mode of Kaya's marks.

b) Work out his mean homework mark.

2) Lydia rolled an 8-sided dice ten times.
Here are her scores.

5 1 2 5 3 8 6 6 3 2

a) Work out Lydia's median score.

b) Work out the mean of her scores.

3) In a two-week period, a train was this many minutes late each day:

3 0 0 0 7 4 5 2 0 1 14 0 5 1

a) What was the mean average number of minutes late?

b) What was the median average number of minutes late?

4) Two small Year 10 classes, Set A and Set B, sat the same Science test.

Set A had these scores for the test:

63%, 71%, 48%, 95%, 46%, 82%, 77%, 36%, 73%

Set B had these scores:

58%, 63%, 85%, 61%, 59% 38%, 90%, 84%, 75%, 48%

How much bigger was Set B's mean average score than Set A's mean average score?
Give your answer correct to 1 decimal place.

5) A rugby team played six games.
The mean score for the six games is 15
The rugby team played one more game.
The mean score for all seven games is 16
Work out the number of points the team scored in the seventh game.

Multiplying Decimals

1) Work out

a) 6×0.2

b) 0.2×0.3

c) 0.4×7

d) 0.2×0.8

e) 0.03×0.9

f) 1.5×0.2

2) A box contains 7 books, each weighing 2.5 kg.

Work out the total weight of the box.

3) Jim takes 13 boxes out of his van.

The weight of each box is 25.5 kg.

Work out the total weight of the 13 boxes.

4) Tim has a job which pays £6.85 per hour.

If he works for 34 hours, one week, how much does he earn?

5) Sue has a part-time job and the hourly pay is £7.50 per hour.

How much does she earn if she works for 8.5 hours, one week?

6) Fencing costs £13.25 per metre.

How much does 12.5 m cost?

Dividing Decimals

1) Work out

a) $9 \div 0.3$

b) $6 \div 0.1$

c) $12 \div 0.4$

d) $25 \div 0.5$

e) $21 \div 0.3$

f) $15 \div 0.2$

2) Work out

a) $3.6 \div 0.4$

b) $0.8 \div 0.2$

c) $2.4 \div 0.4$

d) $0.56 \div 0.08$

e) $5.5 \div 0.05$

f) $8.1 \div 0.09$

3) John takes boxes out of his van.
The total weight of the boxes is 4.9 kg
The weight of each box is 0.7 kg
Work out the number of boxes in John's van.

4) Mr Rogers bought a bag of elastic bands for £6
Each elastic band costs 12p.
Work out the number of elastic bands in the bag.

Multiplying Fractions

In all the questions on this page, please give your answers in their simplest form.

1) Work out the following:

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

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

c) $\frac{3}{5} \times \frac{2}{7}$

d) $\frac{4}{7} \times \frac{5}{9}$

2) Work out the following:

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

b) $\frac{3}{4} \times \frac{8}{11}$

c) $\frac{2}{9} \times \frac{3}{4}$

d) $\frac{4}{5} \times \frac{1}{12}$

3) Work out the following:

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

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

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

d) $1\frac{2}{7} \times 3\frac{1}{3}$

Dividing Fractions

In all the questions on this page, please give your answers in their simplest form.

1) Work out the following:

a) $\frac{2}{5} \div \frac{3}{4}$

b) $\frac{1}{7} \div \frac{3}{5}$

c) $\frac{4}{9} \div \frac{1}{2}$

d) $\frac{3}{10} \div \frac{5}{9}$

2) Work out the following:

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

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

c) $\frac{1}{9} \div \frac{2}{3}$

d) $\frac{2}{5} \div \frac{3}{10}$

3) Work out the following:

a) $1\frac{1}{3} \div \frac{1}{4}$

b) $\frac{3}{5} \div 2\frac{2}{3}$

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

d) $4\frac{1}{2} \div 1\frac{1}{2}$

Standard Form

1) Change the following to normal (or ordinary) numbers.

a) 4.3×10^4

b) 6.79×10^6

c) 7.03×10^3

d) 9.2×10^2

e) 1.01×10^4

f) 4×10^5

2) Change the following to normal (or ordinary) numbers.

a) 4.3×10^{-4}

b) 6.79×10^{-6}

c) 7.03×10^{-3}

d) 9.2×10^{-2}

e) 1.01×10^{-4}

f) 4×10^{-5}

3) Change the following to standard form.

a) 360

b) 8 900

c) 520 000

d) 60000

e) 1 003

f) 6 450 000

4) Change the following to standard form.

a) 0.071

b) 0.0008

c) 0.00076

d) 0.0928

e) 0.00009

f) 0.00000173

5) Work out the following, giving your answer in standard form.

a) $3\,000 \times 5\,000$

b) 240×0.0002

c) $9 \times 1.1 \times 10^7$

d) $5 \times 4 \times 10^3$

e) $\dfrac{8 \times 10^4}{4 \times 10^2}$

f) $9 \times 10^2 \times 2 \times 10^{-5}$

g) $7 \times 10^2 \times 3 \times 10^{-4}$

h) $2 \times 3.6 \times 10^{-5}$

i) $6 \times 4.1 \times 10^3$

Expanding Brackets

1) Expand these brackets

a) $2(x + 3)$

b) $3(2x + 4)$

c) $5(3p – 2q)$

d) $4(x^2 + 2y^2)$

e) $6(r – r^2)$

2) Expand these brackets

a) $x(x – 2)$

b) $x(3x + 5)$

c) $p(3p – 7q)$

d) $y(y + 6y^2)$

e) $x(r + r^2)$

3) Expand these brackets

a) $2x(x – 5)$

b) $4x(2x + 3)$

c) $5p(4p – 2q)$

d) $2y(3y + 4x^2)$

e) $x(x + r^2)$

4) Expand these brackets

a) $x(x^2 – 2)$

b) $3x(2x^3 + 1)$

c) $5p^2(4p – 2)$

d) $2y^2(3y^3 + 4y)$

e) $2xy(x + y^2)$

Simple Factorisation

1) Factorise

a) $2x + 4$

b) $2y + 10$

c) $3x + 12$

d) $3x - 6$

e) $5x - 15$

2) Factorise

a) $p^2 + 7p$

b) $x^2 + 4x$

c) $y^2 - 2y$

d) $p^2 - 5p$

e) $x^2 + x$

3) Factorise

a) $2x^2 + 6x$

b) $2y^2 - 8y$

c) $5p^2 + 10p$

d) $7c^2 - 21c$

e) $6x^2 + 9x$

4) Factorise

a) $2x^2 - 4xy$

b) $2t^2 + 10tu$

c) $6x^2 - 8xy$

d) $3x^2y^2 + 9xy$

Generate a Sequence from the *n*th Term

1) The *n*th term of a number sequence is $2n + 5$

Write down the first three terms of the sequence.

2) The *n*th term of a number sequence is $3n - 1$

Write down the first four terms of the sequence.

3) The *n*th term of a number sequence is $3n + 2$

Write down the first four terms of the sequence.

4) The *n*th term of a number sequence is $5n - 7$

Write down the first four terms of the sequence.

5) The *n*th term of a number sequence is n^2

Write down the first three terms of the sequence.

6) The *n*th term of a number sequence is $n^2 + 3$

Write down the first three terms of the sequence.

7) The *n*th term of a number sequence is $11 - n^2$

a) Find the third term of this sequence.

b) Find the fifth term of this sequence.

8) The *n*th term of a number sequence is $n^2 + n$

a) Find the third term of this sequence.

b) Find the fifth term of this sequence.

Finding the *n*th Term

1) Here are the first five terms of an arithmetic sequence.

1 3 5 7 9

Find, in terms of *n*, an expression for the *n*th term of this sequence.

2) Here are the first five terms of an arithmetic sequence.

6 10 14 18 22

Find, in terms of *n*, an expression for the *n*th term of this sequence.

3) Here are the first five terms of an arithmetic sequence.

1 4 7 10 13

Find, in terms of *n*, an expression for the *n*th term of this sequence.

4) Here are the first five terms of an arithmetic sequence.

7 12 17 22 27

Find, in terms of *n*, an expression for the *n*th term of this sequence.

5) Here are the first five terms of an arithmetic sequence.

8 6 4 2 0

Find, in terms of *n*, an expression for the *n*th term of this sequence.

Sharing Using Ratio

1) Tom and Julie share £48 in the ratio 5 : 3
Work out how much more money Tom gets than Julie gets.

2) Ben and Sue share £60 in the ratio 2 : 3
Work out how much each person gets.

3) A box contains milk chocolates and plain chocolates only.
The number of milk chocolates to the number of plain chocolates is in the ratio 2 : 1
There are 24 milk chocolates.
Work out the total number of chocolates.

4) Andy, Ben and Claire share £54
Ben gets three times as much money as Andy.
Claire gets twice as much money as Ben.

How much money does Claire get?

5) There are some marbles in a bag.
18 of the marbles are blue.
12 of the marbles are red.
a) Write down the ratio of the number of blue marbles to the number of red marbles.
Give your ratio in its simplest form.

There are some apples and pears in a box.
The total number of apples and pears is 54.
The ratio of the number of apples to the number of pears is 1 : 5
b) Work out the number of pears in the box.

6) A piece of string is 180 cm long.
Jim cuts it into three pieces in the ratio 2 : 3 : 4
Work out the length of the longest piece.

7) Sally is 13 years old.
Tammy is 12 years old.
Danny is 10 years old.

Sally, Tammy and Danny share £28 in the ratio of their ages.
Tammy gives a third of her share to her mother.
How much should Tammy now have?

Index Notation

1) Write as a power of 8

a) $8^4 \times 8^3$ b) $8^{12} \div 8^7$

2) Write as a power of 3

a) $3^2 \times 3^9$ b) $3^{10} \div 3^3$

3) Simplify

a) $k^5 \times k^2$

b) $x^4 \div x^2$

c) $\dfrac{k^{11}}{k^6}$

d) $(k^8)^2$

4) Simplify

eg. $(2xy^3)^4 = 2xy^3 \times 2xy^3 \times 2xy^3 \times 2xy^3 = 16x^4y^{12}$

a) $(2xy^5)^3$

b) $(2x^2y^2)^3$

c) $(4xy^4)^2$

d) $(3xy^2)^4$

5) $2^x \times 2^y = 2^{10}$

and

$2^x \div 2^y = 2^2$

Work out the value of x and the value of y.

6) $5^x \times 5^y = 5^{12}$

and

$5^x \div 5^y = 5^6$

Work out the value of x and the value of y.

7) $a = 2^x$, $b = 2^y$

Express in terms of a and b

a) 2^{x+y}

b) 2^{2x}

c) 2^{3y}

d) 2^{x+2y}

Expanding and Simplifying Brackets

1) Expand these brackets

a) $2(x + 3)$

b) $3(2x + 4)$

c) $5(3p - 2q)$

d) $4(x^2 + 2y^2)$

e) $6(r - r^2)$

2) Expand these brackets

a) $x(x - 2)$

b) $x(3x + 5)$

c) $p(3p - 7q)$

d) $y(y + 6y^2)$

e) $x(r + r^2)$

3) Expand these brackets

a) $2x(x - 5)$

b) $4x(2x + 3)$

c) $5p(4p - 2q)$

d) $2y(3y + 4x^2)$

e) $x(x + r^2)$

4) Expand these brackets

a) $x(x^2 - 2)$

b) $3x(2x^3 + 1)$

c) $5p^2(4p - 2)$

d) $2y^2(3y^3 + 4y)$

e) $2xy(x + y^2)$

5) Expand and simplify

a) $2(x + y) + 3(x + y)$

b) $3(2x + y) + 2(5x + 3y)$

c) $5(x + y) + 3(2x + y)$

d) $3(2c + d) + 2(c + d)$

e) $4(2p + q) + 3(2p + q)$

6) Expand and simplify

a) $2(x + y) + 3(x - y)$

b) $5(2x + y) + 2(3x - 2y)$

c) $4(x - y) + 3(2x + y)$

d) $6(2c - d) + 2(c - d)$

e) $2(5p - q) + 3(p - 2q)$

7) Expand and simplify

a) $3(x + 2y) - 3(x - y)$

b) $5(2x - y) - 2(3x - 2y)$

c) $7(x - 2y) - 3(2x + y)$

d) $6(2x - y) - 2(x + 2y)$

e) $2(5p - q) - (p - 3q)$

Expanding and Simplifying Brackets

1) Expand and simplify

a) $(x + 3)(x + 2)$

b) $(x + 5)(x + 3)$

c) $(x + 1)(x + 4)$

d) $(x + 6)(x + 4)$

e) $(x + 5)(x + 7)$

2) Expand and simplify

a) $(x + 5)(x - 2)$

b) $(x - 7)(x + 2)$

c) $(x - 1)(x + 3)$

d) $(x + 4)(x - 3)$

e) $(x - 5)(x + 5)$

3) Expand and simplify

a) $(x - 3)(x - 4)$

b) $(x - 2)(x - 6)$

c) $(x - 1)(x - 1)$

d) $(x - 7)(x - 2)$

e) $(x - 4)(x - 5)$

4) Expand and simplify

a) $(x - 7)(x + 1)$

b) $(p - 6)(p + 4)$

c) $(e - 3)(e - 7)$

d) $(x + 8)(x + 1)$

e) $(x - 5)(x - 5)$

5) Expand and simplify

a) $(2x + 3)(2x + 1)$

b) $(3p - 4)(2p + 5)$

c) $(e - 3)(3e - 4)$

d) $(4x - 6)(2x + 1)$

e) $(2x - 3)(2x + 3)$

6) Expand and simplify

a) $(2x + y)(3x + 2y)$

b) $(3p - 2q)(4p + 5q)$

c) $(4e - 3f)(2e - 2f)$

d) $(6x - y)(6x + y)$

e) $(3x - 2y)(x - 5y)$

Solving Equations

1) Solve $2x - 3 = 17$

2) Solve $3x + 2 = 14$

3) Solve $5x - 7 = 33$

4) Solve $4x + 7 = 19$

5) Solve $x + x + x + x = 20$

6) Solve $x + 3x = 24$

7) Solve $2(x + 3) = 8$

8) Solve $2(3x - 4) = 22$

9) Solve $5(t - 1) = 20$

10) Solve $3(2x + 5) = 36$

11) Solve $2x + 7 = x + 11$

12) Solve $5y - 2 = 3y + 10$

13) Solve $2x + 1 = 5x - 20$

14) Solve $p - 3 = 3p - 11$

15) Solve $2d + 5 = 20 - 3d$

16) Solve $4 - e = 2e - 8$

17) Solve $2(x + 3) = x + 9$

18) Solve $x - 7 = 3(2x - 4)$

19) Solve $5(x + 3) = 2(x + 6)$

20) Solve $4(2y + 1) = 2(12 - y)$

21) Solve $7 - 3x = 2(x + 1)$

22) Solve $\frac{x}{2} = 5$

23) Solve $\frac{x}{5} = 6$

24) Solve $\frac{2x}{3} = 4$

25) Solve $\frac{5x}{2} = 15$

26) Solve $\frac{x - 2}{3} = 1$

27) Solve $\frac{x + 5}{2} = 7$

28) Solve $\frac{2x + 1}{4} = 2$

29) Solve $\frac{5x - 3}{3} = 4$

30) Solve $\frac{x + 2}{3} = x + 4$

31) Solve $\frac{3x - 1}{4} = 2x - 3$

32) Solve $\frac{4x + 3}{5} = \frac{2x - 1}{2}$