Algebra & Equations

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Algebraic Expressions

Q1) a) $P = 2r - 2s$. What is the value of P when $r = -4$ and $s = -3$?

b) $Q = 3(2r - 3s)$. What is the value of Q when $r = 1$ and $s = -1$?

Q2) Change the subject of the formula to a.

a) $3a - x = a + 2x$

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

c) $r = \frac{\sqrt{t}}{5}$

d) $\sqrt{t + 3} = s$

e) $z = \frac{a-3}{5-a}$

f) $x(a - 1) = b(a + 2)$

Q3) Expand the brackets and simplify the expression.

a) $5(x - 4) + 7$

b) $2 + 3(2 - t)$

c) $-3(c - 2) + c$

d) $5x + 2(x - 3)$

e) $4(a - 5) + 3(2a + 1)$

f) $m(m - 2) - m(3m + 5)$

Q4) Factorise the expression as either a common factor, difference of two squares or trinomial.

a) $x^2 + 4x$

b) $x^2 - 49$

c) $2x - x^2$

d) $x^2 + 7x$

e) $x^2 - 8x + 15$

f) $36 - r^2$

g) $x^2 + 3x - 18$

h) $4x^2 - 64$

Q5) Write the following in the form $(x+p)^2+q$

a) x^2-4x+7

b) $x^2+4x-23$

c) $x^2-16x+2$

d) x^2+8x

Algebraic Fractions

Q1) Simplify the algebraic fraction fully.

a) $\frac{4t-6}{2}$

b) $\frac{2x+3x}{x}$

c) $\frac{12}{3r-9}$

d) $\frac{a^2-3a}{a^2+6a}$

e) $\frac{x-2}{x^2-4}$

f) $\frac{t^2-2t}{t^2+t-6}$

Q2) Evaluate the following.

a) $\frac{3a}{5} \times \frac{10}{7a}$

b) $\frac{2}{5x} \times \frac{4x}{7}$

c) $\frac{5x}{6} \div \frac{7x}{8}$

d) $\frac{2x}{5y} \div \frac{8}{15y}$

Q3) Evaluate the following.

a) $\frac{(x+3)}{4}+\frac{(x-2)}{3}$

b) $\frac{2}{(x+3)}-\frac{3}{(x-2)}$

c) $\frac{3}{x}+\frac{2}{(x-3)}$

d) $\frac{2}{(x-1)}-\frac{1}{(x+1)}$

Equations & Inequations

Q1) Solve the following linear equations.

a) $3x=20-x$

b) $t+3=5-t$

c) $3+5s=2s+13$

d) $5x-7=3x$

e) $x=3x-2+7$

f) $4a=3-2a-23$

g) $2(x+3)-5=9$

h) $3r-7(1+r)=12$

Q2) Solve the following linear inequations.

a) $3n>9$

b) $t+2<-1$

c) $7k>3k-16$

d) $8+2x>3(4-x)$

Q3) Solve the following simultaneous equations.

a) $3x - y = 1$
$x + y = 1$

b) $2x + y = 7$
$x + y = 4$

c) $x + 3y = 10$
$2x + 5y = 18$

d) $2x + y = 10$
$-x + 2y = 9$

Sequences

Q1) For each sequence i) write down the first 4 terms ii) write down the first term, a, and the common difference, d.

a) $u_n = 5n + 2$

b) $u_n = 9 - 2n$

Q2) Determine the 10th and 15th terms of the following arithmetic sequence:

$2, 5, 8, 11, 14, \ldots$

Q3) Calculate the number of terms in the following arithmetic sequence:

$x, 3x, 5x, \ldots, 35x$

Q4) The first term of an arithmetic sequence is 14. The fourth term is 32.

Find the common difference.

Q5) Continue the following geometric sequences for three more terms:

a) $5, 15, 45, \ldots$

b) $1, p, p^2, \ldots$

Q6) Determine the 8th and 12th terms of the following geometric sequence:

$3, 6, 12, 24, 48, \ldots$

Q7) If 3, x, and 9 are the first three terms of a geometric sequence, find:

a) The exact value of x.

b) The exact value of the 4^{th} term.

Q8) The sixth term of a geometric sequence is 32 and the 3rd term is 4.

Find the first term and the common ratio.