

Name:

Class/Set:

Demo Algebra Questions

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Please write your answers on this worksheet, showing all necessary working.

1: Simplify the following:

a) $(z^8)^6$

b) $y^{10} \div y^6$

c) $\frac{w^3}{w \times w}$

d) $h \times h \times h \times h \times h$

2: Simplify the following:

a) $\frac{15t^{14}u^{19}}{5t^{10}u^{10}}$

b) $(4r^5p^{10})^3$

c) $4g^6c^5 \times 5g^2c^9$

d) $(3x^3k^7)^2$

3: Simplify the following:

a) $9q + 3q$

b) $f - 6e - 10f + 4e$

c) $5a + 2n - 3 - 6a + 10n - 10$

d) $4b + 3 + 3b - 7$

4: Multiply out and simplify the following:

a) $-6(6v - 9)$

b) $6(-8j + 3)$

c) $5m(10m - 6s)$

d) $-4(-7t + 8) - 3(2t + 6)$

5: Factorise the following:

a) $-16c - 6$

b) $7g^2 - 42gh$

c) $72u^2 - 16u$

d) $12w + 40$

6: Multiply out and simplify the following:

a) $(r + 2)(r + 10)$

b) $(q - 2)(q - 8)$

c) $(f - 1)(f + 6)$

d) $(x - 10)(x + 10)$

7: Factorise the following:

a) $p^2 - 5p$

b) $n^2 - 1$

c) $z^2 - 7z - 30$

d) $j^2 - 3j + 2$

8: Factorise the following:

a) $30y^2 + 11y + 1$

b) $2k^2 - 15k - 27$

9: Simplify the following as far as possible:

a) $\frac{20(v + 4)}{12}$

b) $\frac{4m + 2}{4}$

10: Simplify the following as far as possible:

a) $\frac{a^2 - 4a}{3a^2 - a}$

b) $\frac{48e^2 + 16e}{40e^2 - 20e}$

11: Simplify the following as far as possible:

a) $\frac{b^2 + b - 2}{b + 2}$

b) $\frac{s^2 - 49}{s + 7}$

12: Simplify the following as far as possible:

a) $\frac{p + 3}{2} - \frac{p}{3}$

b) $\frac{5(3g + 2)}{6} + \frac{g}{9}$

13: Simplify the following as far as possible:

a) $\frac{5}{w + 2} + \frac{2}{w - 1}$

b) $\frac{5}{f - 2} - \frac{4}{3f - 2}$

14: Simplify the following as far as possible:

a) $\frac{3c + 3}{4c} \times \frac{5}{9c + 9}$

b) $\frac{3}{14x - 21} \div \frac{5}{8x - 12}$

15: Simplify the following as far as possible:

a) $\frac{7}{u^2 - 16} \div \frac{5}{u^2 + 2u - 8}$

b) $\frac{4}{n^2 + 4n - 5} \times \frac{n^2 + 3n - 4}{9}$

16: Work out the following:

a) $6t + 3j$ when $t = 7$ and $j = -6$.

b) $k - 5h$ when $k = -7$ and $h = -4$.

17: Rearrange to make x the subject:

a) $y = \left(\frac{x-3}{4}\right)^2$

b) $y = 6\sqrt{x-3}$

18: Rearrange to make x the subject:

a) $y = \frac{-10x-3}{x-1}$

b) $y = \frac{x-6}{x-9}$

19: Solve the following:

a) $7v = -21$

b) $2z - 7 = 3$

20: Solve the following:

a) $11y = 9y + 20$

b) $11(a - 2) = a - 32$

21: Solve the following:

a) $q \propto \frac{1}{e^2}$. If $q = 8$ when $e = 14$, find e when $q = 392$

b) r is directly proportional to b . If $r = 40$ when $b = 5$, find b when $r = 24$

22: Solve the following:

a) $7s - 2m = 20$
 $-s + 8m = 28$

b) $-9c + 9p = 63$
 $3c - 6p = -39$

23: Solve using the quadratic formula, giving your answer in simplified surd form:

a) $g^2 + 5g + 3 = 0$

b) $w^2 - 8w + 2 = 0$

24: Solve the following simultaneous equations:

a) $j = z^2 + 3z - 6$

$j = -z - 1$

b) $x = u^2 - 5u - 15$

$x = -4u + 5$

25: Solve the following inequalities:

a) $2x^2 - 20 < 180$

b) $3x^2 - 8 \geq 40$

Answers: Demo Algebra Questions

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1: a) z^{48} b) y^4 c) w d) h^5

2: a) $3t^4u^9$ b) $64r^{15}p^{30}$ c) $20g^8c^{14}$ d) $9x^6k^{14}$

3: a) $12q$ b) $-9f - 2e$ c) $-a + 12n - 13$ d) $7b - 4$

4: a) $-36v + 54$ b) $-48j + 18$ c) $50m^2 - 30ms$ d) $22t - 50$

5: a) $-2(8c + 3)$ b) $7g(g - 6h)$ c) $8u(9u - 2)$ d) $4(3w + 10)$

6: a) $r^2 + 12r + 20$ b) $q^2 - 10q + 16$ c) $f^2 + 5f - 6$ d) $x^2 - 100$

7: a) $p(p - 5)$ b) $(n + 1)(n - 1)$ c) $(z + 3)(z - 10)$ d) $(j - 1)(j - 2)$

8: a) $(6y + 1)(5y + 1)$ b) $(k - 9)(2k + 3)$

9: a) $\frac{5(v + 4)}{3}$ b) $\frac{2m + 1}{2}$

10: a) $\frac{a - 4}{3a - 1}$ b) $\frac{4(3e + 1)}{5(2e - 1)}$

11: a) $b - 1$ b) $s - 7$

12: a) $\frac{3p + 9}{6} - \frac{2p}{6} = \frac{p + 9}{6}$ b) $\frac{45g + 30}{18} + \frac{2g}{18} = \frac{47g + 30}{18}$

13: a) $\frac{5w - 5}{(w + 2)(w - 1)} + \frac{2w + 4}{(w - 1)(w + 2)} = \frac{7w - 1}{(w + 2)(w - 1)}$
b) $\frac{15f - 10}{(f - 2)(3f - 2)} - \frac{4f - 8}{(3f - 2)(f - 2)} = \frac{11f - 2}{(f - 2)(3f - 2)}$

14: a) $\frac{3(c + 1)}{4c} \times \frac{5}{9(c + 1)} = \frac{15(c + 1)}{36c(c + 1)} = \frac{5}{12c}$ b) $\frac{3}{7(2x - 3)} \times \frac{4(2x - 3)}{5} = \frac{12(2x - 3)}{35(2x - 3)} = \frac{12}{35}$

15: a) $\frac{7}{(u - 4)(u + 4)} \times \frac{(u - 2)(u + 4)}{5} = \frac{7(u - 2)(u + 4)}{5(u - 4)(u + 4)} = \frac{7(u - 2)}{5(u - 4)}$
b) $\frac{4}{(n - 1)(n + 5)} \times \frac{(n - 1)(n + 4)}{9} = \frac{4(n - 1)(n + 4)}{9(n - 1)(n + 5)} = \frac{4(n + 4)}{9(n + 5)}$

16: a) 24 b) 13

17: a) $x = 4\sqrt{y + 3}$

b) $x = \left(\frac{y + 3}{6}\right)^2$

18: a) $x = \frac{y - 3}{y + 10}$

b) $x = \frac{9y - 6}{y - 1}$

19: a) $v = -3$

b) $z = 5$

20: a) $y = 10$

b) $a = -1$

21: a) 2

b) 3

22: a) $s = 4, m = 4$

b) $c = -1, p = 6$

23: a) $g = -2\frac{1}{2} \pm \frac{1}{2}\sqrt{13}$

b) $w = 4 \pm \sqrt{14}$

24: a) $z = -5$ and $j = 4$
 $z = 1$ and $j = -2$

b) $u = -4$ and $x = 21$
 $u = 5$ and $x = -15$

25: a) $-10 < x < 10$

b) $x \leq -4$ or $x \geq 4$