

## A Level Maths Summer Transition Work

Videos can be found on Corbettmaths.com

All questions can be completed without a calculator

Video 14

Question 4: Expand and simplify

(a)  $(2c + 1)(2c + 3)$       (b)  $(5x + 1)(2x + 5)$       (c)  $(3w + 2)(w + 1)$

(d)  $(3p + 2)(2p - 1)$       (e)  $(5g - 4)(g + 1)$       (f)  $(2a - 3)(4a + 7)$

(g)  $(4r - 5)(2r - 3)$       (h)  $(2y - 3)(9y - 1)$       (i)  $(5k - 4)(2k - 1)$

Question 5: Expand and simplify

(a)  $(a + 2)^2$       (b)  $(x + 7)^2$       (c)  $(z - 9)^2$       (d)  $(p + 1)^2$

(e)  $(c - 5)^2$       (f)  $(k + 4)^2$       (g)  $(y - 3)^2$       (h)  $(10 + r)^2$

(i)  $(3g + 2)^2$       (j)  $(2b - 1)^2$       (k)  $(3m - 5)^2$       (l)  $(2v + 9)^2$

Video 13

Question 6: Expand and simplify

(a)  $w(w + 5) + w(w + 7)$       (b)  $2g(4g + 3) + g(g - 7)$       (c)  $n(n - 4) - n(5 - n)$

(d)  $2e(4e + 3) - 3e(e - 5)$       (e)  $a(3 + c) + c(a + 2)$       (f)  $m(a + 7) - a(4 - 3m)$

(g)  $8c(8 - 3a) + 3(4 - c)$       (h)  $5y(3y + z) - 2y(4y - 3z)$       (i)  $4c(3c - c^2) - 2c^2(4 - 5c)$

Video 118

Question 5: Factorise each of the following

(a)  $x^2 + 6x - 16$       (b)  $x^2 + 24x + 23$       (c)  $x^2 - 5x - 14$       (d)  $x^2 - 7x + 12$

(e)  $x^2 + 12x + 36$       (f)  $x^2 - 2x - 63$       (g)  $x^2 + 14x + 24$       (h)  $x^2 + 17x + 60$

(i)  $x^2 - 11x + 30$       (j)  $x^2 - 4x - 32$       (k)  $x^2 - 2x - 63$       (l)  $x^2 - 16x - 17$

Video 119

Question 2: Factorise each of the following

(a)  $3x^2 + x - 4$

(b)  $7x^2 + 20x - 3$

(c)  $2x^2 - 13x + 15$

(d)  $3x^2 - 17x + 10$

(e)  $3x^2 - 16x - 12$

(f)  $3x^2 - x - 4$

(g)  $5x^2 - 13x - 6$

(h)  $3x^2 + 8x - 3$

(i)  $2x^2 - x - 10$

Video 119a

Question 4: Factorise each of the following

(a)  $9x^2 - 12x - 5$

(b)  $4x^2 - 4x - 3$

(c)  $4x^2 - 11x + 6$

(d)  $6x^2 - 7x + 2$

(e)  $10x^2 - 91x + 9$

(f)  $4x^2 + 25x - 56$

(g)  $6x^2 - 35x + 49$

(h)  $6x^2 - 7x - 10$

(i)  $8x^2 + 10x - 3$

Video 24

Question 1: Simplify the following algebraic fractions

(a)  $\frac{42xyz}{56}$

(b)  $\frac{45ab}{60abc}$

(c)  $\frac{16mn}{18n}$

(d)  $\frac{40x^2y}{32xy}$

(e)  $\frac{17cf}{34c^3}$

(f)  $\frac{8x^4}{2x^2}$

(g)  $\frac{33a^2b^2}{44a^3b}$

(h)  $\frac{12x^3}{20x^7}$

Question 4: Simplify the following algebraic fractions

$$(g) \frac{x^2 - 2x - 8}{x^2 + 6x - 40}$$

$$(h) \frac{x^2 + 10x + 24}{x^2 - 36}$$

$$(i) \frac{x^2 + 4x - 45}{x^2 + 10x + 9}$$

$$(j) \frac{x^2 + 11x}{x^2 - 121}$$

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

$$(l) \frac{x^2 - 15x + 44}{x^2 - 16}$$

Video 21

Question 3: Express the following as a single simplified fraction.

$$(d) \frac{3x + 11}{2} + \frac{x - 20}{3}$$

$$(e) \frac{5x - 4}{2} + \frac{x + 1}{3}$$

$$(f) \frac{x - 4}{8} + \frac{2x - 3}{2}$$

$$(g) \frac{7x + 4}{2} - \frac{x + 1}{3}$$

$$(h) \frac{9x + 1}{5} - \frac{x + 2}{2}$$

$$(i) \frac{3x + 11}{2} - \frac{2x - 3}{6}$$

Question 5: Solve the following equations

$$(a) \frac{x + 5}{3} + \frac{x + 1}{2} = 8$$

$$(b) \frac{x + 6}{5} + \frac{x - 3}{2} = 13$$

$$(c) \frac{2x - 1}{4} + \frac{x - 3}{5} = 3$$

$$(d) \frac{x + 5}{10} - \frac{x + 4}{2} = 1$$

Video 266

Question 5: Solve each of the equations below

(a)  $x^2 + 2x = -1$

(b)  $y^2 + 8y + 10 = 3$

(c)  $x^2 = 7x - 12$

Question 5: Solve each of the equations below

(a)  $2x^2 + 5x = 0$

(b)  $2x^2 - 9x = 0$

(c)  $3x^2 + x = 0$

(d)  $4x^2 + 15x = 0$

(e)  $5x^2 - x = 0$

(f)  $6x + 3x^2 = 0$

(g)  $15x - 2x^2 = 0$

(h)  $16x^2 - 20x = 0$

Video 17

Question 5: Write as a single power of y.

(a)  $y^7 \times y^3$  (b)  $y^9 \div y^7$  (c)  $y^6 \div y^2$  (d)  $(y^3)^5$  (e)  $y^7 \div y$  (f)  $y^3 \div y^7$  (g)  $(y^9)^5$

(h)  $y^6 \times y^7$  (i)  $y^6 \times y^5 \times y^2$  (j)  $y^8 \times y \times y^3$  (k)  $\frac{y^8}{y^5}$

Question 6: Write as a single power of x.

(a)  $(2x^3)^2$  (b)  $(5x^6)^2$  (c)  $(5x^5)^3$  (d)  $(2x^3)^4$  (e)  $(7x^5)^2$  (f)  $(4x^7)^3$  (g)  $(2x^6)^6$

(h)  $(10x^9)^3$  (i)  $(3x^4)^4$

Video 175

Question 5: Write each of the following as fractions

(a)  $a^{-2}$  (b)  $y^{-1}$  (c)  $w^{-4}$  (d)  $2^{-x}$  (e)  $5^{-a}$  (f)  $x^{-n}$

Question 6: Write each of the following in index form

(a)  $\frac{1}{w^2}$  (b)  $\frac{1}{2^y}$  (c)  $\frac{1}{x^5}$  (d)  $\frac{1}{4^x}$  (e)  $\frac{1}{y^x}$  (f)  $\frac{1}{m^n}$

Evaluate:

(a)  $\left(\frac{8}{343}\right)^{-2/3}$       (b)  $\left(\frac{1}{125}\right)^{-2/3}$   
(c)  $\left(\frac{343}{64}\right)^{-2/3}$       (d)  $\left(\frac{4}{9}\right)^{-3/2}$   
(e)  $\left(\frac{100}{9}\right)^{-3/2}$       (f)  $\left(\frac{27}{8}\right)^{-4/3}$   
(g)  $\left(\frac{25}{4}\right)^{-3/2}$       (h)  $\left(\frac{16}{10000}\right)^{-3/4}$

Video 295

Question 3: Solve the following simultaneous equations by using elimination.

(p)  $4x + 3y = 9$                       (q)  $4x - 2y = 18$                       (r)  $5x + 2y = 38$   
     $5x + 2y = 13$                        $2x - 3y = 15$                        $2x - 3y = 19$

Video 8

Question 1: Make x the subject of each of the following

(e)  $s = uy + \frac{1}{2}xy^2$                       (f)  $\frac{1}{3}w = \frac{1}{4}x + t$   
(g)  $j = \frac{x+3}{d}$                               (h)  $g = \frac{t}{x-2}$   
(i)  $p = 3(y+2x)^2$                       (j)  $12w = \frac{3}{4}(2x+a)$

Question 2: Make m the subject of the following formulae

(o)  $y - mp = np + 2y$                       (p)  $m(r+p) = r(h-m)$   
(q)  $\pi x = \frac{m+8}{m-1}$                               (r)  $\frac{3m+2}{c} = \frac{m+1}{a}$

Video 10

Question 4: Use completing the square to find the minimum point for each graph below

(a)  $y = x^2 + 10x + 12$

(b)  $y = x^2 + 4x + 1$

(c)  $y = x^2 + 6x + 8$

(d)  $y = x^2 - 2x + 3$

(e)  $y = x^2 - 6x - 3$

(f)  $y = x^2 - x - 4$

(g)  $y = x^2 + 9x + 1$

(h)  $y = x^2 - 6x - 2$

(i)  $y = x^2 + 22x + 100$

Videos 267 and 305

Use the quadratic formula to solve these equations, leaving your answer in simplified surd form

(a)  $4x^2 - 9x + 4 = 0$

(b)  $7x^2 + 3x = 2$

(c)  $x^2 + 3x - 6 = 0$

(d)  $7x^2 + 12x + 2 = 0$

Answers

Question 4:

(a)  $4c^2 + 8c + 3$

(b)  $10x^2 + 27x + 5$

(c)  $3w^2 + 5w + 2$

(d)  $6p^2 + p - 2$

(e)  $5g^2 + g - 4$

(f)  $8a^2 + 2a - 21$

(g)  $8r^2 - 22r + 15$

(h)  $18y^2 - 29y + 3$

(i)  $10k^2 - 13k + 4$

Question 5:

(a)  $a^2 + 4a + 4$

(b)  $x^2 + 14x + 49$

(c)  $z^2 - 18z + 81$

(d)  $p^2 + 2p + 1$

(e)  $c^2 - 10c + 25$

(f)  $k^2 + 8k + 16$

(g)  $y^2 - 6y + 9$

(h)  $100 + 20r + r^2$

(i)  $9g^2 + 12g + 4$

(j)  $4b^2 - 4b + 1$

(k)  $9m^2 - 30m + 25$

(l)  $4v^2 + 36v + 81$

Question 6:

(a)  $2w^2 + 12w$

(b)  $9g^2 - g$

(c)  $2n^2 - 9n$

(d)  $5e^2 + 21e$

(e)  $3a + 2ac + 2c$

(f)  $4am + 7m - 4a$

(g)  $61c - 24ac + 12$

(h)  $7y^2 + 11yz$

(i)  $4c^2 + 6c^3$

Question 5:

a)  $(x + 8)(x - 2)$

b)  $(x+23)(x+1)$

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

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

e)  $(x+6)(x+6)$

f)  $(x+7)(x-9)$

g)  $(x+2)(x+12)$

h)  $(x + 12)(x + 5)$

i)  $(x-5)(x-6)$

j)  $(x-8)(x+4)$

k)  $(x-9)(x+7)$

l)  $(x-17)(x+1)$

Question 2:

(a)  $(3x + 4)(x - 1)$

(b)  $(7x - 1)(x + 3)$

(c)  $(2x - 3)(x - 5)$

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

(e)  $(3x + 2)(x - 6)$

(f)  $(3x - 4)(x + 1)$

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

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

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

Question 4:

(a)  $(3x - 5)(3x + 1)$

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

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

(d)  $(3x - 2)(2x - 1)$

(e)  $(10x - 1)(x - 9)$

(f)  $(4x - 7)(x + 8)$

(g)  $(2x - 7)(3x - 7)$

(h)  $(6x + 5)(x - 2)$

(i)  $(2x + 3)(4x - 1)$

Question 1: Simplify the following algebraic fractions

(a)  $\frac{42xyz}{56}$  (b)  $\frac{45ab}{60abc}$  (c)  $\frac{16mn}{18n}$  (d)  $\frac{40x^2y}{32xy}$

(e)  $\frac{17cf}{34c^3}$  (f)  $\frac{8x^4}{2x^2}$  (g)  $\frac{33a^2b^2}{44a^3b}$  (h)  $\frac{12x^3}{20x^7}$

(g)  $\frac{x^2 - 2x - 8}{x^2 + 6x - 40}$  (h)  $\frac{x^2 + 10x + 24}{x^2 - 36}$  (i)  $\frac{x^2 + 4x - 45}{x^2 + 10x + 9}$

(j)  $\frac{x^2 + 11x}{x^2 - 121}$  (k)  $\frac{x^2 - 1}{x^2 + x}$  (l)  $\frac{x^2 - 15x + 44}{x^2 - 16}$

$$(d) \frac{11x - 7}{6}$$

$$(e) \frac{17x - 10}{6}$$

$$(f) \frac{9x - 16}{8}$$

$$(g) \frac{19x + 10}{6}$$

$$(h) \frac{13x - 8}{10}$$

$$(i) \frac{7x + 36}{6}$$

### Question 5

(a)  $x = 7$

(b)  $x = 19$

(c)  $x = 5.5$

(d)  $x = -6.25$

### Question 5

(a)  $x = -1$

(b)  $y = -7, y = -1$

(c)  $y = 3, y = 4$

5:

a)  $x = 0$  and  $x = -2 \frac{1}{2}$

b)  $x = 0$  and  $x = 4 \frac{1}{2}$

c)  $x = 0$  and  $x = -\frac{1}{3}$

d)  $x = 0$  and  $x = -3 \frac{3}{4}$

e)  $x = 0$  and  $x = \frac{1}{5}$

f)  $x = 0$  and  $x = -2$

g)  $x = 0$  and  $x = 7 \frac{1}{2}$

h)  $x = 0$  and  $x = 1 \frac{1}{4}$

Question 5:

- (a)  $y^{10}$       (b)  $y^2$       (c)  $y^4$       (d)  $y^{15}$       (e)  $y^6$   
(f)  $y^4$       (g)  $y^{45}$       (h)  $y^{13}$       (i)  $y^{13}$       (j)  $y^{12}$   
(k)  $y^3$

Question 6:

- (a)  $4x^6$       (b)  $25x^{12}$       (c)  $125x^{15}$       (d)  $16x^{12}$   
(e)  $49x^{10}$       (f)  $64x^{21}$       (g)  $64x^{36}$       (h)  $1000x^{27}$   
(i)  $81x^{16}$

Question 5: Write each of the following as fractions

- (a)  $a^{-2}$       (b)  $y^{-1}$       (c)  $w^{-4}$       (d)  $2^{-x}$       (e)  $5^{-a}$       (f)  $x^{-n}$   
 $\frac{1}{a^2}$        $\frac{1}{y}$        $\frac{1}{w^4}$        $\frac{1}{2^x}$        $\frac{1}{5^a}$        $\frac{1}{x^n}$

Question 6: Write each of the following in index form

- (a)  $\frac{1}{w^2}$       (b)  $\frac{1}{2^y}$       (c)  $\frac{1}{x^5}$       (d)  $\frac{1}{4^x}$       (e)  $\frac{1}{y^x}$       (f)  $\frac{1}{m^n}$   
 $w^{-2}$        $2^{-y}$        $x^{-5}$        $4^{-x}$        $y^{-x}$        $m^{-n}$

- (a)  $\frac{49}{4}$       (b) 25  
(c)  $\frac{16}{49}$       (d)  $\frac{27}{8}$   
(e)  $\frac{27}{1000}$       (f)  $\frac{16}{81}$   
(g)  $\frac{8}{125}$       (h) 125

$$\begin{aligned} \text{(p)} \quad x &= 3 \\ y &= -1 \end{aligned}$$

$$\begin{aligned} \text{(q)} \quad x &= 3 \\ y &= -3 \end{aligned}$$

$$\begin{aligned} \text{(r)} \quad x &= 8 \\ y &= -1 \end{aligned}$$

$$\text{(e)} \quad x = \frac{2S - 2uy}{y^2}$$

$$\text{(f)} \quad x = \frac{4}{3}w - 4t$$

$$\text{(g)} \quad x = dj - 3$$

$$\text{(h)} \quad x = \frac{t}{g} + 2$$

$$\text{(i)} \quad x = \frac{\sqrt{\frac{p}{3}} - y}{2}$$

$$\text{(j)} \quad x = 8w - \frac{1}{2}a$$

(Alternative forms available)

$$\text{(o)} \quad m = -n - \frac{y}{p}$$

$$\text{(p)} \quad m = \frac{hr}{p + 2r}$$

$$\text{(q)} \quad m = \frac{\pi x + 8}{\pi x - 1}$$

$$\text{(r)} \quad m = \frac{c - 2a}{3a - c}$$

(Alternative forms available)

Question 4

(a) (-5, -13)

(b) (-2, -3)

(c) (-3, -1)

(d) (1, 2)

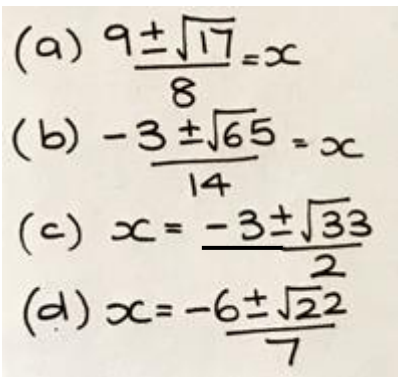
(e) (3, -12)

(f) (0.5, -4.25)

(g) (-4.5, -19.25)

(h) (3, -11)

(i) (-11, -21)



(a)  $\frac{9 \pm \sqrt{17}}{8} = x$   
(b)  $\frac{-3 \pm \sqrt{65}}{14} = x$   
(c)  $x = \frac{-3 \pm \sqrt{33}}{2}$   
(d)  $x = \frac{-6 \pm \sqrt{22}}{7}$