

A level Maths and Further Maths Transition Work – Answers

1. Fractions

- a. $\frac{2}{5}$
- b. $-\frac{1}{7}$
- c. $\frac{7}{10}$
- d. $\frac{5}{2} = 2\frac{1}{2}$
- e. $\frac{5}{24}$
- f. $\frac{47}{30} = 1\frac{17}{30}$
- g. $\frac{38}{15} = 2\frac{8}{15}$
- h. $\frac{203}{15} = 13\frac{8}{15}$
- i. 5
- j. $\frac{3}{5}$

2. Laws of Indices

- a. 2^7
- b. $3^1 = 3$
- c. 4^6
- d. x^{15}
- e. a^6
- f. $c^{-2} = \frac{1}{c^2}$
- g. $\frac{1}{9}$
- h. 1
- i. 54
- j. 36
- k. 8
- l. 3

3. Surds

- a. $5\sqrt{7}$
- b. $\sqrt{2}$
- c. 21
- d. 18
- e. $3\sqrt{2}$
- f. $4\sqrt{2}$
- g. $3\sqrt{6}$
- h. $2\sqrt{3}$

4. Expanding and Simplifying Expressions

- a. $6b^2 + 8b + 3$
- b. $5x - 15$
- c. $-6x - 2$
- d. $22x + 1$
- e. $4x - 6$
- f. $x^2 - 1$
- g. $3a^2 - a - 2$
- h. $6b^2 - 13b + 6$
- i. $4xy$
- j. $9x^2$
- k. $x + 2y$
- l. $\frac{2}{x+2}$
- m. $\frac{2}{5x-2}$

5. Factorising

- a. $4(x + 2)$
- b. $a(2b + d)$
- c. $2x(4x - 5)$
- d. $4ab(2b - a)$
- e. $(x + 3)(x + 1)$
- f. $(x + 5)(x + 3)$
- g. $(x + 14)(x - 2)$
- h. $(x - 15)(x - 2)$
- i. $(x + 6)(x - 6)$
- j. $(2x + 5)(x + 1)$

6. Solving Linear Equations

- a. $x = 5$
- b. $x = \frac{21}{4}$
- c. $x = 6$
- d. $p = \frac{3}{4}$
- e. $x = 2$
- f. $x = 2$
- g. $x = 3$

7. Formulae

- $x = 3$
- $x = \frac{9}{8}$
- $r = 7.00(3sf)$
- $c = 8$
- $a = \frac{5}{2}$
- $x = \frac{b}{3}$
- $x = 5d$
- $x = 4 - f$
- $x = \frac{5y+2}{6}$
- $x = \frac{c}{a-b}$
- $x = \frac{u}{m+2}$
- $x = y^2 + 2$

8. Solving Quadratic Equations

- $x = -1, x = -4$
- $x = 6, x = -2$
- $x = 9, x = -9$
- $x = 1 + \sqrt{7}, x = 1 - \sqrt{7}$
- $x = 3 + \sqrt{17}, 3 - \sqrt{17}$
- $x = \frac{-5+\sqrt{46}}{3}, x = \frac{-5-\sqrt{46}}{3}$

9. Simultaneous Linear Equations

- $x = 7, y = 4$
- $x = \frac{1}{4}, y = \frac{3}{2}$
- $x = 3, y = -2$
- $x = 2, y = 1$
- $x = 1, y = -5$

10. Completing the Square

- a** $= (x+1)^2 - 1 + 4$
 $= (x+1)^2 + 3$
b $= (x-1)^2 - 1 + 4$
 $= (x-1)^2 + 3$
c $= (x-2)^2 - 4 + 1$
 $= (x-2)^2 - 3$
d $= (x+3)^2 - 9$
- e** $= (x+2)^2 - 4 + 8$
 $= (x+2)^2 + 4$
f $= (x-4)^2 - 16 - 5$
 $= (x-4)^2 - 21$
g $= (x+6)^2 - 36 + 30$
 $= (x+6)^2 - 6$
h $= (x-5)^2 - 25 + 25$
 $= (x-5)^2$
- i** $= (x+3)^2 - 9 - 9$
 $= (x+3)^2 - 18$
j $= (x-2)^2 - 4 + 18$
 $= (x-2)^2 + 14$
k $= (x + \frac{3}{2})^2 - \frac{9}{4} + 3$
 $= (x + \frac{3}{2})^2 + \frac{3}{4}$
l $= (x + \frac{1}{2})^2 - \frac{1}{4} - 1$
 $= (x + \frac{1}{2})^2 - \frac{5}{4}$
- a** $= 2[x^2 + 2x] + 3$
 $= 2[(x+1)^2 - 1] + 3$
 $= 2(x+1)^2 + 1$
b $= 2[x^2 - 4x] - 7$
 $= 2[(x-2)^2 - 4] - 7$
 $= 2(x-2)^2 - 15$
c $= 3[x^2 - 2x] + 3$
 $= 3[(x-1)^2 - 1] + 3$
 $= 3(x-1)^2$
d $= 4[x^2 + 6x] + 11$
 $= 4[(x+3)^2 - 9] + 11$
 $= 4(x+3)^2 - 25$
- e** $= -[x^2 + 2x] - 5$
 $= -[(x+1)^2 - 1] - 5$
 $= -(x+1)^2 - 4$
f $= -[x^2 - 10x] + 1$
 $= -[(x-5)^2 - 25] + 1$
 $= -(x-5)^2 + 26$
g $= 2[x^2 + x] - 1$
 $= 2[(x + \frac{1}{2})^2 - \frac{1}{4}] - 1$
 $= 2(x + \frac{1}{2})^2 - \frac{3}{2}$
h $= 3[x^2 - 3x] + 5$
 $= 3[(x - \frac{3}{2})^2 - \frac{9}{4}] + 5$
 $= 3(x - \frac{3}{2})^2 - \frac{7}{4}$
- i** $= 3[x^2 - 8x] + 48$
 $= 3[(x-4)^2 - 16] + 48$
 $= 3(x-4)^2$
j $= 3[x^2 - 5x]$
 $= 3[(x - \frac{5}{2})^2 - \frac{25}{4}]$
 $= 3(x - \frac{5}{2})^2 - \frac{75}{4}$
k $= 5[x^2 + 8x] + 70$
 $= 5[(x+4)^2 - 16] + 70$
 $= 5(x+4)^2 - 10$
l $= 2[x^2 + \frac{5}{2}x] + 2$
 $= 2[(x + \frac{5}{4})^2 - \frac{25}{16}] + 2$
 $= 2(x + \frac{5}{4})^2 - \frac{9}{8}$
- m** $= 4[x^2 + \frac{3}{2}x] - 7$
 $= 4[(x + \frac{3}{4})^2 - \frac{9}{16}] - 7$
 $= 4(x + \frac{3}{4})^2 - \frac{37}{4}$
n $= -2[x^2 - 2x] - 1$
 $= -2[(x-1)^2 - 1] - 1$
 $= -2(x-1)^2 + 1$
o $= -3[x^2 + \frac{2}{3}x] + 4$
 $= -3[(x + \frac{1}{3})^2 - \frac{1}{9}] + 4$
 $= -3(x + \frac{1}{3})^2 + \frac{13}{3}$
p $= \frac{1}{3}[x^2 + \frac{3}{2}x] - \frac{1}{4}$
 $= \frac{1}{3}[(x + \frac{3}{4})^2 - \frac{9}{16}] - \frac{1}{4}$
 $= \frac{1}{3}(x + \frac{3}{4})^2 - \frac{7}{16}$

11. Inequalities

1. $x < 5$
2. $x < 7$
3. $x > 10$
4. $x \geq -3$
5. $x > 2$
6. $x > 6$
7. $x > 4$
8. $x \leq 10$

14. Harder Simultaneous Equations

1. $x = -3, y = -14$ or $x = -2, y = -12$
2. $x = -2, y = 2$
3. $x = -1, y = 1$ or $x = 2, y = 4$
4. $x = 1, y = -2$
5. $x = -\frac{18}{5}, y = -\frac{24}{5}$ or $x = 6, y = 0$
6. $x = -4, y = -3$ or $x = 0, y = 5$
7. $x = 1 + \frac{\sqrt{14}}{2}, y = 1 - \frac{\sqrt{14}}{2}$ or $x = 1 - \frac{\sqrt{14}}{2}, y = 1 + \frac{\sqrt{14}}{2}$