ANSWERS

Use your personalised Question Level Analysis to complete the corresponding and subsequent section/s (red, amber and green) of each topic.

Topic: Simplifying Indices

RED

Fully simplify the following expressions.

(a) $x^2 \times x^4$ x^6 (b) $\frac{x^5}{x^3}$ x^2 (c) x^0 1

(d) $(x^3)^4$ x^{12} (e) $\frac{x^3}{x^{-2}}$ x^5 (f) $\frac{x^2 \times x^4}{x^3}$ x^3

(g) $\sqrt{x}$ $x^{1/2}$ (h) $(\sqrt[3]{x})^6$ x^2 (i) $x \times x^5$ x^6

(j) $\frac{x^2 \times x^{-3}}{x^{-5}}$ x^4 (k) $\frac{(x^{-3})^2}{x^3}$ x^{-9} (l) $x^3 \times (x^5)^2$ x^{13}

AMBER

Fully simplify the following expressions.

(a) $3x^4 \times 5x^2$ $15x^6$ (b) $\frac{8x^5}{2x^3}$ $4x^2$ (c) $5x^0$ 5

(d) $(2x^3)^4$ $16x^{12}$ (e) $(5x)^0$ 1 (f) $\frac{3x^2 \times 2x^4}{4x^3}$ $\frac{3}{2}x^3$

(g) $\sqrt{9x}$ $3x^{1/2}$ (h) $\frac{(2x^3)^4}{4x^{-3}}$ $4x^{15}$ (i) $2x^3 \times (3x^5)^2$ $18x^{13}$

(j) $(27x^6)^{2/3}$ $9x^4$ (k) $\frac{(16x^6)^{1/2}}{2x^{-2}}$ $2x^5$ (l) $\frac{3x^3}{6x^{-2}}$ $\frac{1}{2}x^5$

GREEN

Fully simplify the following expressions.

(a) $(16x^8)^{3/4}$ $8x^6$ (b) $2x^3 \times (4x^6)^{1/2}$ $4x^6$ (c) $\frac{(3x^4)^3}{3x^{-2}}$ $3x^{14}$

Write the following as a power of 4.

(d) 16^3 4^6 (e) 2 $4^{1/2}$ (f) 8 $4^{3/2}$

(g) $\frac{1}{2}$ $4^{-1/2}$ (h) $\frac{1}{8}$ $4^{-3/2}$ (i) $(\sqrt{2})^3$ $4^{3/4}$

(j) $2 \times \sqrt{2}$ $4^{3/4}$ (k) 64^{3x} 4^{9x} (l) $8^{x/2}$ $4^{3x/4}$

Mark your work and make corrections.

Further practice: Pearson Edexcel Year 1/AS textbook – Ex 1D

Topic: Solving Equations with Indices

RED

Solve the following equations.

(a) $3^x = 81$ $x = 3$

(b) $16^x = 4$ $x = \frac{1}{2}$

(c) $2^x = \frac{1}{2}$ $x = -1$

(d) $5^{2x} = \frac{1}{25}$ $x = -1$

(e) $10^{1-x} = 10^4$ $x = -3$

(f) $4^{2x} + 1 = 65$ $x = \frac{3}{2}$

(g) $6^{3x-2} = 6^{2x+1}$ $x = 3$

(h) $2^{2x-1} = 8$ $x = 2$

(i) $6^{3x-8} = 36^{2x}$ $x = -8$

(j) $3^{2x-1} = 27^x$ $x = -1$

(k) $3^2 \times 3^x = 27^x$ $x = 1$

(l) $2^{x-1} = \frac{1}{4}$ $x = -1$

AMBER

Solve the following equations.

(a) $3^{3x} \times 3^{2x} = 3^8$ $x = \frac{8}{5}$

(b) $\frac{2^{3x}}{2^2} = 2^8$ $x = \frac{10}{3}$

(c) $\frac{2^{2x}}{2^{-3}} = 2^8$ $x = \frac{5}{2}$

(d) $2^2 \times 2^{8x} = 2^{-3}$ $x = -\frac{5}{8}$

(e) $x^{-2} = 49$ $x = \frac{1}{7}$

(f) $x^{2/3} = \frac{25}{9}$ $x = \frac{125}{27}$

(g) $x^{-1/2} = \frac{9}{4}$ $x = \frac{16}{81}$

(h) $4^{2x} = 8^{x+1}$ $x = 3$

(i) $4^{3x-1} = 16^{x+2}$ $x = 5$

(j) $\left(\frac{1}{4}\right)^{x+1} = 8^x$ $x = -\frac{2}{5}$

(k) $4^{x+1} = \frac{1}{64}$ $x = -4$

(l) $\frac{3^{3+x}}{27^{1+x}} = 9$ $x = -1$

GREEN

Solve the following equations.

(a) $16^{1/5} \times 2^x = 8^{3/4}$ $x = \frac{29}{20}$

(b) $\frac{1}{\sqrt[3]{9^4}} = 3^x$ $x = \frac{8}{3}$

(c) $\sqrt[3]{9} \times \sqrt[4]{27} = 3^x$ $x = \frac{17}{12}$

(d) $4^{3x+1} \times 32^{1.2x} = 16^{11-x}$ $x = \frac{21}{4}$

(e) $\frac{4^{4+x}}{2^{5-x}} = \frac{1}{8}$ $x = -2$

(f) $\frac{(2^x)^5}{2^3} = \frac{2}{(2^4)^x}$ $x = \frac{5}{9}$

(g) $3^{x^2-3x} = 81$ $x = 4$ or -1

(h) $4^{2x^2+2x} = 8$ $x = \frac{1}{2}$ or $-\frac{3}{2}$

(i) $y^{-3} = 3\frac{3}{8}$ $x = \frac{2}{3}$

(j) $6x^{-1/2} - x^{1/2} = 5$ Hint: use $y = x^{1/2}$ $x = 1$ or -6

Mark your work and make corrections.

Further practice: Pearson Edexcel Year 1/AS textbook – Mixed Ex 1, Q22, 23, 24

Topic: Simplifying Surds

RED

Simplify the following surds without using a calculator.

(a) $\sqrt{12}$ $2\sqrt{3}$

(b) $\sqrt{18}$ $3\sqrt{2}$

(c) $\sqrt{28}$ $2\sqrt{7}$

(d) $\sqrt{24}$ $2\sqrt{6}$

(e) $\sqrt{27}$ $3\sqrt{3}$

(f) $\sqrt{32}$ $4\sqrt{2}$

(g) $\frac{\sqrt{20}}{2}$ $\sqrt{5}$

(h) $3\sqrt{75}$ $15\sqrt{3}$

(i) $\sqrt{18}+\sqrt{32}$ $7\sqrt{2}$

(j) $\sqrt{75}-\sqrt{48}$ $\sqrt{3}$

(k) $3\sqrt{45}-2\sqrt{20}$ $5\sqrt{5}$

(l) $3\sqrt{32}\times 2\sqrt{12}$ $48\sqrt{6}$

AMBER

Simplify the following surds without using a calculator.

(a) $\sqrt{98}$ $7\sqrt{2}$

(b) $\sqrt{80}$ $4\sqrt{5}$

(c) $2\sqrt{20}$ $4\sqrt{5}$

(d) $10\sqrt{75}$ $50\sqrt{3}$

(e) $\sqrt{8}\times\sqrt{5}\times\sqrt{9}$ $6\sqrt{10}$

(f) $\sqrt{8}\times\sqrt{12}\times\sqrt{3}$ $12\sqrt{2}$

(g) $\frac{\sqrt{18}}{\sqrt{2}}$ 3

(h) $\frac{15\sqrt{14}}{3\sqrt{2}}$ $5\sqrt{7}$

(i) $4\sqrt{6}\times 3\sqrt{15}$ $36\sqrt{10}$

(j) $2\sqrt{70}\times 3\sqrt{10}$ $60\sqrt{7}$

(k) $\sqrt{5}(3\sqrt{2}-\sqrt{5})$ $-5+3\sqrt{10}$

(l) $\sqrt{12}(7-\sqrt{3})$ $-6+14\sqrt{3}$

GREEN

Simplify the following surds without using a calculator.

(a) $\sqrt{3}(\sqrt{5}+\sqrt{2})$ $\sqrt{15}+\sqrt{6}$

(b) $\sqrt{6}(3\sqrt{5}-\sqrt{6})$ $-6+3\sqrt{30}$

(l) $\sqrt{15}(6-\sqrt{3})$ $6\sqrt{15}-3\sqrt{5}$

(d) $(\sqrt{2}+5)(1+\sqrt{2})$ $7+6\sqrt{2}$

(e) $(\sqrt{7}-1)(\sqrt{7}+1)$ 6

(f) $(\sqrt{12}+\sqrt{3})(\sqrt{3}+2)$ $9+6\sqrt{3}$

(g) $(1+2\sqrt{2})(2-\sqrt{2})$ $-2+3\sqrt{2}$

(h) $(3\sqrt{5}+7)(2\sqrt{5}+1)$ $37+17\sqrt{5}$

(i) $(1+\sqrt{5})^2$ $6+2\sqrt{5}$

(j) $(10-\sqrt{2})^2$ $102-20\sqrt{2}$

(k) $(2\sqrt{3}-1)^2$ $13-4\sqrt{3}$

(l) $(5\sqrt{2}+3\sqrt{3})^2$ $77+30\sqrt{6}$

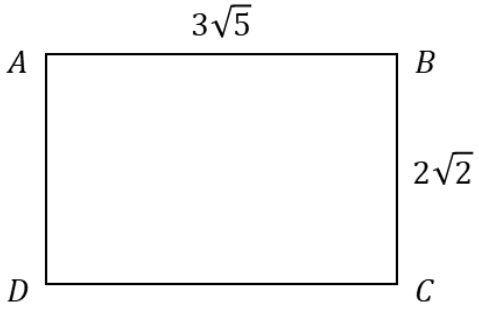
Mark your work and make corrections.

Further practice: Pearson Edexcel Year 1/AS textbook – Ex 1E

Topic: Problem-Solving with Surds

RED

All measurements are in centimetres.



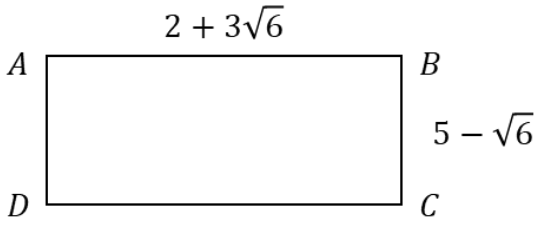
(a) Calculate the perimeter of the rectangle.
Simplify your answer. $6\sqrt{5} + 4\sqrt{2}$ cm

(b) Calculate the area of the rectangle.
Simplify your answer. $6\sqrt{10}$ cm²

(c) Calculate the length of the rectangle's diagonal.
Simplify your answer. $\sqrt{53}$ cm

AMBER

All measurements are in centimetres.



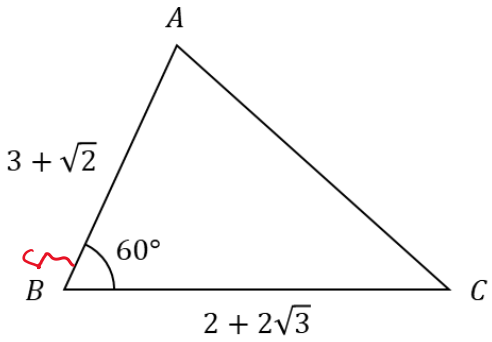
(a) Calculate the perimeter of the rectangle.
Simplify your answer. $14 + 4\sqrt{6}$ cm

(b) Calculate the area of the rectangle.
Simplify your answer. $-8 + 13\sqrt{6}$ cm²

(c) Calculate the length of the rectangle's diagonal.
Simplify your answer. 9.69 cm

GREEN

All measurements are in centimetres.



(a) Calculate the area of the triangle.
Simplify your answer. $\frac{3\sqrt{3} + 9 + \sqrt{6} + 3\sqrt{2}}{2}$ cm

(b) Calculate the perimeter of the triangle.
Simplify your answer. $21 + 4\sqrt{2} + 2\sqrt{3} + 2\sqrt{6}$ cm

In any triangle ABC where a, b and c are the length of the sides:

sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$

Mark your work and make corrections.
Further practice: Pearson Edexcel Year 1/AS textbook – Mixed Ex 1, Q21

Topic: Rationalising the Denominator

RED

Rationalise the denominator of the following surds without using a calculator.

(a) $\frac{2}{\sqrt{3}}$ $\frac{2\sqrt{3}}{3}$ (b) $\frac{5}{\sqrt{2}}$ $\frac{5\sqrt{2}}{2}$ (c) $\frac{7}{\sqrt{6}}$ $\frac{7\sqrt{6}}{6}$

(d) $\frac{1}{\sqrt{10}}$ $\frac{\sqrt{10}}{10}$ (e) $\frac{4}{3\sqrt{2}}$ $\frac{2\sqrt{2}}{3}$ (f) $\frac{9}{3\sqrt{6}}$ $\frac{\sqrt{6}}{2}$

(g) $\frac{\sqrt{2}}{\sqrt{3}}$ $\frac{\sqrt{6}}{3}$ (h) $\frac{3}{5\sqrt{2}}$ $\frac{3\sqrt{2}}{10}$ (i) $\frac{5}{2\sqrt{80}}$ $\frac{\sqrt{5}}{8}$

(j) $\frac{5\sqrt{5}}{\sqrt{20}}$ $\frac{5}{2}$ (k) $\frac{\sqrt{2}+1}{\sqrt{5}}$ $\frac{\sqrt{10}+\sqrt{5}}{5}$ (l) $\frac{2-\sqrt{3}}{2\sqrt{3}}$ $\frac{2\sqrt{3}-3}{6}$

AMBER

Rationalise the denominator of the following surds without using a calculator.

(a) $\frac{3\sqrt{5}}{\sqrt{12}}$ $\frac{\sqrt{15}}{2}$ (b) $\frac{\sqrt{2}+3}{\sqrt{3}}$ $\frac{\sqrt{6}+3\sqrt{3}}{3}$ (c) $\frac{1-\sqrt{3}}{3\sqrt{5}}$ $\frac{\sqrt{5}-\sqrt{15}}{15}$

(d) $\frac{1+3\sqrt{2}}{\sqrt{6}}$ $\frac{\sqrt{6}+6\sqrt{3}}{6}$ (e) $\frac{6}{3-\sqrt{2}}$ $\frac{18+6\sqrt{2}}{7}$ (f) $\frac{4}{1+\sqrt{5}}$ $\frac{2-2\sqrt{5}}{3}$

(g) $\frac{8}{\sqrt{3}-\sqrt{2}}$ $8\sqrt{3}+8\sqrt{2}$ (h) $\frac{\sqrt{2}}{\sqrt{10}+\sqrt{8}}$ $\sqrt{5}-2$ (i) $\frac{3\sqrt{6}}{\sqrt{6}-3}$ $-6-3\sqrt{6}$

(j) $\frac{1}{2\sqrt{3}+\sqrt{5}}$ $\frac{2\sqrt{3}-\sqrt{5}}{7}$ (k) $\frac{1+\sqrt{5}}{1-\sqrt{5}}$ $\frac{-3-\sqrt{5}}{2}$ (l) $\frac{\sqrt{11}-\sqrt{3}}{\sqrt{11}+\sqrt{3}}$ $\frac{7-\sqrt{33}}{4}$

GREEN

Rationalise the denominator of the following surds without using a calculator.

(a) $\frac{3}{2+\sqrt{3}}$ $6-3\sqrt{3}$ (b) $\frac{\sqrt{5}}{\sqrt{2}-1}$ $\sqrt{10}+\sqrt{5}$ (c) $\frac{\sqrt{3}}{2\sqrt{2}+5}$ $\frac{5\sqrt{3}-2\sqrt{6}}{17}$

(d) $\frac{1+\sqrt{3}}{1-\sqrt{3}}$ $-2-\sqrt{3}$ (e) $\frac{\sqrt{5}+3}{2\sqrt{5}-2}$ $\frac{2+\sqrt{5}}{2}$ (f) $\frac{3\sqrt{2}-4}{5\sqrt{2}-2}$ $\frac{11-7\sqrt{2}}{23}$

(g) $\frac{\sqrt{3}(\sqrt{5}+\sqrt{2})}{\sqrt{5}}$ $\frac{\sqrt{30}+5\sqrt{3}}{5}$ (h) $\frac{(\sqrt{7}-1)(\sqrt{7}+1)}{\sqrt{7}}$ $\frac{6\sqrt{7}}{7}$ (i) $\frac{(\sqrt{12}+\sqrt{3})(\sqrt{3}+2)}{\sqrt{3}}$ $6+3\sqrt{3}$

(j) $\frac{(3\sqrt{5}+7)(2\sqrt{5}+1)}{3\sqrt{5}}$ $\frac{85+37\sqrt{5}}{15}$ (k) $\frac{(10-\sqrt{2})^2}{2\sqrt{3}}$ $\frac{51\sqrt{3}-10\sqrt{6}}{3}$ (l) $\frac{(5\sqrt{2}+2\sqrt{3})^2}{3+2\sqrt{2}}$ $186-124\sqrt{2}+60\sqrt{6}-80\sqrt{3}$

Mark your work and make corrections.

Further practice: Pearson Edexcel Year 1/AS textbook – Ex 1F

Topic: Expanding and Simplifying Brackets

RED

Expand, and simplify if possible, the expressions.

(a) $3(a+5)$ $3a+15$

(b) $5(x-2)$ $5x-10$

(c) $4(2-3f)$ $8-12f$

(d) $h(h-3)$ h^2-3h

(e) $m(3n-2m)$ $3mn-2m^2$

(f) $3r(2r-3s)$ $6r^2-9rs$

(g) $5(5z+12)+3(5z-2)$ $40z+54$

(h) $r(5r+p)-2r(r+p)$ $3r^2-pr$

(i) $4a(3b+p)-2a(a-p)$ $12ab+6ap-2a^2$

(j) $(x+2)(x+3)$ x^2+5x+6

(k) $(x-4)(x+5)$ x^2+x-20

(l) $(x-2)(x-5)$ $x^2-7x+10$

AMBER

Expand and simplify the expressions.

(a) $(x+3)(x+7)$ $x^2+10x+21$

(b) $(x-3)(x+4)$ x^2+x-12

(c) $(x-4)(x-2)$ x^2-6x+8

(d) $(x+6)^2$ $x^2+12x+36$

(e) $(x-5)^2$ $x^2-10x+25$

(f) $(3x+1)(4x+3)$ $12x^2+13x+3$

(g) $(2x-3)(3x+7)$ $6x^2+5x-21$

(h) $(4x-1)(2x+3)$ $8x^2+10x-3$

(i) $(5+2x)(3x-5)$ $6x^2+5x-25$

(j) $(3x+2)^2$ $9x^2+12x+4$

(k) $(2x-7)^2$ $4x^2-28x+49$

(l) $x(2x+2)(x+3)$ $2x^3+8x^2+6x$

GREEN

Expand and simplify the expressions.

(a) $(2x+4)(3x-7)$ $6x^2-2x-28$

(b) $(4y+3)(3y+5)$ $12y^2+29y+15$

(c) $x(x+5)(x+3)$ x^3+8x^2+15x

(d) $x(x-8)(x-3)$ x^3-11x^2+24x

(e) $x(x+4)(x-3)$ x^3+x^2-12x

(f) $2x(x-4)(x+7)$ $2x^3+6x^2-56x$

(g) $3x(2x-1)(x+5)$ $6x^3+15x^2-15x$

(h) $(x+5)(x+1)(x+2)$ $x^3+8x^2+17x+10$

(i) $(x-4)(x-2)(x+1)$ x^3-5x^2+2x+8

(j) $(x+4)^2(x-5)$ $x^3+3x^2-34x-30$

(k) $(2x+5)(3x-2)(x+4)$ $6x^3+35x^2+34x-40$

(l) $(2x-3)^2(x-2)$ $4x^3-20x^2+33x-18$

Mark your work and make corrections.

Further practice: Pearson Edexcel Year 1/AS textbook – Ex 1B

Topic: Factorising Expressions

RED

Fully factorise the expressions below.

(a) $3a + 12$ $3(a+4)$

(b) $c^2 + 7c$ $c(c+7)$

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

(d) $18h - 6h^2$ $6h(3-h)$

(e) $8k - 8$ $8(k-1)$

(f) $5ab + 10a$ $5a(b+2)$

(g) $2w^2 - w^3$ $w^2(2-w)$

(h) $8x^2 - 12x^3$ $4x^2(2-3x)$

(i) $12ab^2 + 18a^2b$ $6ab(2b+3a)$

(j) $9x^3y^2 - 6x^4$ $3x^3(3y^2-2x)$

(k) $x^2 + 7x + 12$ $(x+3)(x+4)$

(l) $x^2 + 8x + 16$ $(x+4)^2$

AMBER

Fully factorise the expressions below.

(a) $6ab^2 + 9a^3b$ $3ab(b+3a^2)$

(b) $4ab + 6b^2 - 2b$ $2b(2a+3b-1)$

(c) $x^2 + 8x + 12$ $(x+6)(x+2)$

(d) $x^2 + 14x + 48$ $(x+6)(x+8)$

(e) $x^2 + 15x + 56$ $(x+7)(x+8)$

(f) $x^2 - 12x + 27$ $(x-3)(x-9)$

(g) $x^2 - 3x + 2$ $(x-2)(x-1)$

(h) $x^2 - x - 56$ $(x-8)(x+7)$

(i) $x^2 + 4x - 21$ $(x+7)(x-3)$

(j) $x^2 - 9x - 10$ $(x-10)(x+1)$

(k) $x^2 - 36$ $(x+6)(x-6)$

(l) $x^2 - 81$ $(x+9)(x-9)$

GREEN

Fully factorise the expressions below.

(a) $4x^2 - 19x + 12$ $(4x-3)(x-4)$

(b) $2x^2 + x - 6$ $(2x-3)(x+2)$

(c) $4x^2 - 15x + 9$ $(4x-3)(x-3)$

(d) $4x^2 + 7x + 3$ $(4x+3)(x+1)$

(e) $6x^2 + 19x + 10$ $(3x+2)(2x+5)$

(f) $2x^2 - x - 21$ $(2x-7)(x+3)$

(g) $10x^2 - 11x + 3$ $(5x-3)(2x-1)$

(h) $2x^2 - 10x - 28$ $2(x+2)(x-7)$

(i) $k^3 + 8k^2 + 12k$ $k(k+6)(k+2)$

(j) $x^3 - x^2 - 12x$ $x(x-4)(x+3)$

(k) $2y^3 + 11y^2 + 12y$ $y(2y+3)(y+4)$

(l) $12a^3 + 11a^2 - 5a$ $a(3a-1)(4a+5)$

Mark your work and make corrections.

Further practice: Pearson Edexcel Year 1/AS textbook – Ex 1C

Topic: Solving Equations

RED

Solve the following equations.

(a) $2x - 3 = 7$ $x = 5$

(b) $8 - 3a = -4$ $x = 4$

(c) $\frac{x}{4} + 2 = 5$ $x = 12$

(d) $2a + 5 = 4a - 1$ $x = 3$

(e) $6x + 4 = 2x + 6$ $x = \frac{1}{2}$

(f) $5(4a + 2) = 70$ $a = 3$

(g) $4(2x - 4) = 32$ $x = 6$

(h) $5(a + 4) = 3(a + 6)$ $a = -1$

(i) $2(5x + 2) = 4(2x + 3)$ $x = 4$

(j) $(x - 3)(x + 2) = 0$ $x = 3$ or -2

(k) $(x + 4)(x + 7) = 0$ $x = -4$ or -7

(l) $(x - 2)(x - 5) = 0$ $x = 2$ or 5

AMBER

Solve the following equations.

(a) $(x + 3)(x + 2) = 0$ $x = -3$ or -2

(b) $(x + 3)(x + 3) = 0$ $x = -3$

(c) $x^2 + 25x + 24 = 0$ $x = -1$ or -24

(d) $x^2 + 29x + 100 = 0$ $x = -4$ or -25

(e) $x^2 + 3x - 10 = 0$ $x = -5$ or 2

(f) $x^2 + 2x - 35 = 0$ $x = -7$ or 5

(g) $x^2 - 6x - 27 = 0$ $x = -3$ or 9

(h) $x^2 - 4x - 21 = 0$ $x = 7$ or -3

(i) $x^2 - 5x - 14 = 0$ $x = 7$ or -2

(j) $x^2 + 14x + 24 = 0$ $x = -2$ or -12

(k) $x^2 - 2x - 63 = 0$ $x = 9$ or -7

(l) $x^2 + 18x + 56 = 0$ $x = -4$ or -14

GREEN

Solve the following equations.

(a) $2x^2 + 11x + 15 = 0$ $x = -3$ or $-\frac{5}{2}$

(b) $3x^2 + 4x + 1 = 0$ $x = -1$ or $-\frac{1}{3}$

(c) $5x^2 + 26x + 5 = 0$ $x = -5$ or $-\frac{1}{5}$

(d) $7x^2 + 20x - 3 = 0$ $x = -3$ or $\frac{1}{7}$

(e) $3x^2 - 16x - 12 = 0$ $x = 6$ or $-\frac{2}{3}$

(f) $3x^2 + 8x - 3 = 0$ $x = -3$ or $\frac{1}{3}$

(g) $9x^2 + 9x + 2 = 0$ $x = -\frac{2}{3}$ or $-\frac{1}{3}$

(h) $10x^2 + 9x + 2 = 0$ $x = -\frac{2}{5}$ or $-\frac{1}{2}$

(i) $12x^2 + 13x + 3 = 0$ $x = -\frac{1}{3}$ or $-\frac{3}{4}$

(j) $2x^2 - 41x + 9 = 50 - 8x^2$ $x = 4.931$ or -0.831

(k) $18x^2 - 7x - 3 = 6x(x - 2)$ $x = \frac{1}{3}$ or $-\frac{3}{4}$

(l) $4x^2 - 2x - 5 = 2x - 2$ $x = \frac{3}{2}$ or $-\frac{1}{2}$

Mark your work and make corrections.

Further practice: Pearson Edexcel Year 1/AS textbook – Ex 2A

Topic: Completing the Square

RED

Use completing the square to find the minimum point for each graph below.

(a) $y = x^2 + 8x + 1$ $(-4, -15)$

(b) $y = x^2 + 10x + 3$ $(-5, -22)$

(c) $y = x^2 + 2x - 1$ $(-1, -2)$

(d) $y = x^2 - 6x - 10$ $(3, -19)$

(e) $y = x^2 - 4x - 13$ $(2, -17)$

(f) $y = x^2 - 12x + 3$ $(6, -33)$

(g) $y = x^2 + 14x + 3$ $(-7, -46)$

(h) $y = x^2 - 2x - 15$ $(1, -16)$

(i) $y = x^2 + 4x - 11$ $(-2, -15)$

(j) $y = x^2 - 100x - 25$ $(50, -2525)$

(k) $y = x^2 + 3x + 1$ $\left(-\frac{3}{2}, -\frac{5}{4}\right)$

(l) $y = x^2 - 7x - 2$ $\left(\frac{7}{2}, -\frac{57}{4}\right)$

AMBER

Use completing the square to find the minimum point for each graph below.

(a) $y = x^2 + 4x + 1$ $(-2, -3)$

(b) $y = x^2 + 8x - 10$ $(-4, -26)$

(c) $y = x^2 + 14x - 4$ $(-7, -53)$

(d) $y = x^2 - 8x - 2$ $(4, -18)$

(e) $y = x^2 - 10x + 10$ $(5, -15)$

(f) $y = x^2 + 18x + 7$ $(-9, -74)$

(g) $y = x^2 + x - 8$ $\left(-\frac{1}{2}, -\frac{33}{4}\right)$

(h) $y = x^2 - 9x - 1$ $\left(\frac{9}{2}, -\frac{85}{4}\right)$

(i) $y = x^2 + 11x + 3$ $\left(-\frac{11}{2}, -\frac{109}{4}\right)$

(j) $y = x^2 + x - 7$ $\left(-\frac{1}{2}, -\frac{29}{4}\right)$

(k) $y = x^2 + 3x + 8$ $\left(-\frac{3}{2}, \frac{23}{4}\right)$

(l) $y = 3x^2 + 12x + 3$ $(-2, -9)$

GREEN

Use completing the square to find the minimum point for each graph below.

(a) $y = 2x^2 + 8x + 2$ $(-2, -6)$

(b) $y = 2x^2 + 12x - 3$ $(-3, -21)$

(c) $y = 3x^2 - 12x + 2$ $(2, -10)$

(d) $y = 4x^2 + 12x - 5$ $\left(-\frac{3}{2}, -14\right)$

(e) $y = 2x^2 - 3x - 5$ $\left(\frac{3}{4}, -\frac{49}{8}\right)$

(f) $y = 5x^2 - 20x + 30$ $(2, 10)$

(g) By using completing the square to solve $ax^2 + bx + c = 0$, prove the quadratic formula.

Mark your work and make corrections.

Further practice: Pearson Edexcel Year 1/AS textbook – Ex 2C

$$ax^2 + bx + c = 0$$

$$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$$

$$x^2 + \frac{b}{a}x = -\frac{c}{a}$$

$$\left(x + \frac{b}{2a}\right)^2 = -\frac{c}{a} - \left(\frac{b}{2a}\right)^2$$

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

$$x + \frac{b}{2a} = \pm\frac{\sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Topic: Functions

RED

$f(x) = 3x - 7$

Work out the values of the following.

(a) $f(2) = -1$ (b) $f(5) = 8$ (c) $f(-3) = -16$ (d) $f\left(\frac{1}{2}\right) = -\frac{11}{2}$ (e) $f\left(-\frac{3}{4}\right) = -\frac{37}{4}$

$g(x) = x^2 + 3$

Work out the values of the following.

(f) $g(2) = 7$ (g) $g(5) = 28$ (h) $g(-3) = 12$ (i) $g\left(\frac{1}{2}\right) = \frac{13}{4}$ (j) $g\left(-\frac{3}{4}\right) = \frac{57}{16}$

AMBER

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

Work out the values of the following.

(a) $f(2) = 1$ (b) $f(5) = 16$ (c) $f(-3) = 16$ (d) $f\left(\frac{1}{2}\right) = \frac{1}{4}$ (e) $f\left(-\frac{3}{4}\right) = \frac{49}{16}$

$g(x) = 4x + 5$

Solve the following equations.

(f) $g(x) = 3$ $x = -\frac{1}{2}$ (g) $g(x) = -7$ $x = -3$ (h) $g(x) = 4$ $x = -\frac{1}{4}$ (i) $g(x) = -8$ $x = -\frac{13}{4}$ (j) $g(x) = \frac{1}{2}$ $x = \frac{9}{8}$

GREEN

$f(x) = 2x^2 + 4x + 3$

Work out the values of the following.

(a) $f(2) = 19$ (b) $f(5) = 73$ (c) $f(-3) = 9$ (d) $f\left(\frac{1}{2}\right) = \frac{11}{2}$ (e) $f\left(-\frac{3}{4}\right) = \frac{9}{8}$

$g(x) = x^2 + 7x$

Solve the following equations.

(f) $g(x) = 0$ $x = 0$ or -7 (g) $g(x) = -6$ $x = -1$ or -6 (h) $g(x) = -12$ $x = -3$ or -4 (i) $g(x) = 8$ $x = 1$ or -8 (j) $g(x) = 2$ $x = 0.275$ or -7.275

Mark your work and make corrections.

Further practice: Pearson Edexcel Year 1/AS textbook – Ex 2E, Q1

Topic: Simultaneous Equations

(5,6)

RED

Solve the following pairs of equations. You must show all your working.

(a) $4x + 2y = 10$, $x + 2y = 7$ (1,3)

(b) $3x - 3y = 9$, $2x + y = 12$ (5,2)

(c) $6x - 3y = 12$, $4x - 3y = 2$

(d) $2x + 8y = 43$, $x + 3y = 18$ $\left(\frac{15}{2}, \frac{7}{2}\right)$

(e) $x + 3y = 38$, $x + 6y = 53$ (23,5)

(f) $10x - 15y = 25$, $x - 2y = 1$ (7,3)

(g) $4x + 9y = 10$, $2x + 3y = 2$ (-2,2)

(h) $8x + 4y = -28$, $3x - 12y = 30$ (-2,-3)

(i) $9x - 7y = 111$, $x - 2y = 16$ (10,-3)

AMBER

Solve the following pairs of equations. You must show all your working.

(a) $5x + 3y = 22$, $2x + 4y = 20$ (2,4)

(b) $3x + 3y = -6$, $4x - 4y = -24$ (-4,2)

(c) $3x + 2y = 53$, $2x + 5y = 72$ (11,10)

(d) $2x - 4y = 4$, $5x - 3y = 24$ (6,2)

(e) $4x - 4y = 8$, $5x - 3y = 18$ (6,4)

(f) $5x + 2y = 38$, $2x - 3y = 19$ (8,-1)

(g) $y = x^2 + x - 14$, $y = x - 5$ (3,-2) (-3,-8)

(h) $x + y = 7$, $xy = 10$ (2,5) (5,2)

(i) $x^2 + y^2 = 20$, $y = x + 3$ (1.289, 4.289) (-4.289, -1.289)

GREEN

Solve the following pairs of equations. You must show all your working.

(a) $y = 2x + 1$, $y = x^2 - 2x + 2$ (3.732, 8.464) (0.268, 1.536)

(b) $y = 2x^2 + x + 1$, $y = x^2 - 5x - 7$ (-2,7) (-4,29)

(c) $y = -x^2 + 5x + 2$, $y = 3x^2 - x - 2$ (2,8) $\left(-\frac{1}{2}, -\frac{3}{4}\right)$

(d) $x^2 + y^2 = 13$, $x + y = 5$ (2,3) (3,2)

(e) $xy = -6$, $x + 2y = -4$ (1,-6) (-3,2)

(f) $x^2 + y^2 = 29$, $7 + x + y = 0$ (-2,-5) (-5,-2)

(g) $y = x^2 + x - 7$, $4x + 2y + 1 = 0$ (1.958, -3.916) (-4.958, 8.416)

(h) $y = x - 2$, $2x^2 - xy = 11$ (2.464, 0.464) (-4.464, -6.464)

(i) $5x + y = 5$, $2x^2 - 9x - y = 11$ (-2,15) (4,-15)

Mark your work and make corrections.

Further practice: Pearson Edexcel Year 1/AS textbook – Ex 3A, 3B

Topic: Solving Inequalities

RED

Solve the following inequalities.

(a) $2x + 1 \leq 9$ $x \leq 4$

(b) $3x - 5 > 16$ $x > 7$

(c) $5x - 2 \geq 28$ $x \geq 6$

(d) $1 + \frac{x}{2} \leq 5$ $x \leq 8$

(e) $\frac{x}{9} - 6 > 4$ $x > 90$

(f) $\frac{x-5}{4} < 2$ $x < 13$

(g) $6(x + 2) < 42$ $x < 5$

(h) $2(2x - 9) \geq 22$ $x \geq 10$

(i) $2(5x + 1) \leq 36$ $x \leq \frac{17}{5}$

(j) $x + 1 \geq 3x - 18$ $x \leq \frac{19}{2}$

(k) $13x - 12 < 3x + 13$ $x < \frac{5}{2}$

(l) $7x - 5 \geq 3x + 11$ $x \geq 4$

AMBER

Solve the following inequalities.

(a) $7x + 1 > 60$ $x > \frac{59}{7}$

(b) $10x - 16 \geq 76$ $x \geq \frac{46}{5}$

(c) $9x + 4 > 7x + 15$ $x > \frac{11}{2}$

(d) $6 < x + 3 < 10$ $3 < x < 7$

(e) $4 \leq 2x \leq 7$ $2 \leq x \leq \frac{7}{2}$

(f) $4 < \frac{x}{5} < 6$ $20 < x < 30$

(g) $9 \leq 2x + 3 \leq 25$ $3 \leq x \leq 11$

(h) $-3 \leq \frac{x}{4} - 1 < 0$ $-8 \leq x < 4$

(i) $0 \leq \frac{x-6}{2} < 2$ $6 \leq x < 10$

(j) $(x - 3)(x + 1) < 0$ $-1 < x < 3$

(k) $(x - 6)(x + 7) \geq 0$ $x \leq -7$, $x \geq 6$

(l) $x^2 - x - 12 > 0$ $x < -3$, $x > 4$

GREEN

Solve the following inequalities.

(a) $x(x - 7) < 0$ $0 < x < 7$

(b) $(x - 3)(x - 6) \leq 0$ $3 \leq x \leq 6$

(c) $(x + 4)(x - 5) > 0$ $x < -4$, $x > 5$

(d) $x^2 + 5x + 6 > 0$ $x < 2$, $x > 3$

(e) $x^2 - x - 30 \geq 0$ $x \leq -5$, $x \geq 6$

(f) $x^2 - 8x + 12 < 0$ $2 < x < 6$

(g) $x^2 > 36$ $x < -6$, $x > 6$

(h) $x^2 - 2x \leq 15$ $-3 \leq x \leq 5$

(i) $6x > x^2 - 8x + 40$ $6 < x < 8$

(j) $4x^2 - 3x - 1 \geq 0$ $x < -\frac{1}{4}$, $x > 1$

(k) $6x^2 - 13x + 7 < 0$ $1 < x < \frac{7}{6}$

(l) $15x^2 + 4x - 35 \leq 0$ $-\frac{5}{3} \leq x \leq \frac{7}{5}$

Mark your work and make corrections.

Further practice: Pearson Edexcel Year 1/AS textbook – Ex 3D, 3E