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

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

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

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

AMBER

Fully simplify the following expressions.

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

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

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

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

GREEN

Fully simplify the following expressions.

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

Write the following as a power of 4.

(d) 16^3 (e) 2 (f) 8

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

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

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) $3^x = 81$ (b) $16^x = 4$ (c) $2^x = \frac{1}{2}$

(d) $5^{2x} = \frac{1}{25}$ (e) $10^{1-x} = 10^4$ (f) $4^{2x} + 1 = 65$

(g) $6^{3x-2} = 6^{2x+1}$ (h) $2^{2x-1} = 8$ (i) $6^{3x-8} = 36^{2x}$

(j) $3^{2x-1} = 27^x$ (k) $3^2 \times 3^x = 27^x$ (l) $2^{x-1} = \frac{1}{4}$

AMBER

Solve the following equations.

(a) $3^{3x} \times 3^{2x} = 3^8$ (b) $\frac{2^{3x}}{2^2} = 2^8$ (c) $\frac{2^{2x}}{2^{-3}} = 2^8$

(d) $2^2 \times 2^{8x} = 2^{-3}$ (e) $x^{-2} = 49$ (f) $x^{2/3} = \frac{25}{9}$

(g) $x^{-1/2} = \frac{9}{4}$ (h) $4^{2x} = 8^{x+1}$ (i) $4^{3x-1} = 16^{x+2}$

(j) $\left(\frac{1}{4}\right)^{x+1} = 8^x$ (k) $4^{x+1} = \frac{1}{64}$ (l) $\frac{3^{3+x}}{27^{1+x}} = 9$

GREEN

Solve the following equations.

(a) $16^{1/5} \times 2^x = 8^{3/4}$ (b) $\frac{1}{\sqrt[3]{9^4}} = 3^x$ (c) $\sqrt[3]{9} \times \sqrt[4]{27} = 3^x$

(d) $4^{3x+1} \times 32^{1.2x} = 16^{11-x}$ (e) $\frac{4^{4+x}}{2^{5-x}} = \frac{1}{8}$ (f) $\frac{(2^x)^5}{2^3} = \frac{2}{(2^4)^x}$

(g) $3^{x^2-3x} = 81$ (h) $4^{2x^2+2x} = 8$ (i) $y^{-3} = 3\frac{3}{8}$

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

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) $\sqrt{12}$ (b) $\sqrt{18}$ (c) $\sqrt{28}$

(d) $\sqrt{24}$ (e) $\sqrt{27}$ (f) $\sqrt{32}$

(g) $\frac{\sqrt{20}}{2}$ (h) $3\sqrt{75}$ (i) $\sqrt{18}+\sqrt{32}$

(j) $\sqrt{75}-\sqrt{48}$ (k) $3\sqrt{45}-2\sqrt{20}$ (l) $3\sqrt{32}\times 2\sqrt{12}$

AMBER

Simplify the following surds without using a calculator.

(a) $\sqrt{98}$ (b) $\sqrt{80}$ (c) $2\sqrt{20}$

(d) $10\sqrt{75}$ (e) $\sqrt{8}\times\sqrt{5}\times\sqrt{9}$ (f) $\sqrt{8}\times\sqrt{12}\times\sqrt{3}$

(g) $\frac{\sqrt{18}}{\sqrt{2}}$ (h) $\frac{15\sqrt{14}}{3\sqrt{2}}$ (i) $4\sqrt{6}\times 3\sqrt{15}$

(j) $2\sqrt{70}\times 3\sqrt{10}$ (k) $\sqrt{5}(3\sqrt{2}-\sqrt{5})$ (l) $\sqrt{12}(7-\sqrt{3})$

GREEN

Simplify the following surds without using a calculator.

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

(d) $(\sqrt{2}+5)(1+\sqrt{2})$ (e) $(\sqrt{7}-1)(\sqrt{7}+1)$ (f) $(\sqrt{12}+\sqrt{3})(\sqrt{3}+2)$

(g) $(1+2\sqrt{2})(2-\sqrt{2})$ (h) $(3\sqrt{5}+7)(2\sqrt{5}+1)$ (i) $(1+\sqrt{5})^2$

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

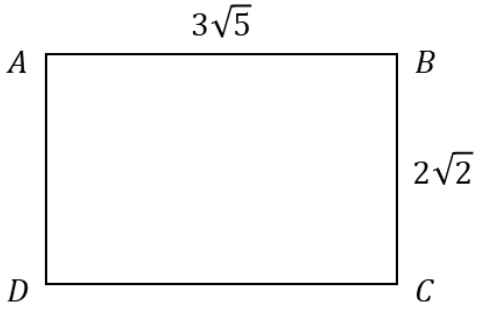
Mark your work and make corrections.

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

Topic: Problem-Solving with Surds

RED

All measurements are in centimetres.



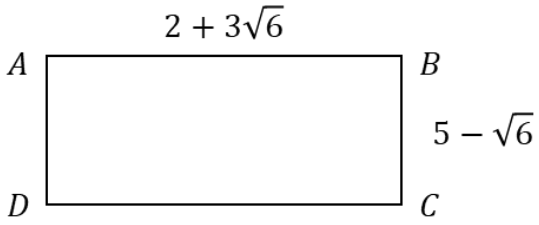
(a) Calculate the perimeter of the rectangle.
Simplify your answer.

(b) Calculate the area of the rectangle.
Simplify your answer.

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

AMBER

All measurements are in centimetres.



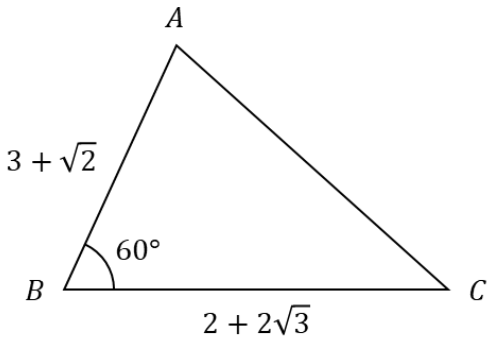
(a) Calculate the perimeter of the rectangle.
Simplify your answer.

(b) Calculate the area of the rectangle.
Simplify your answer.

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

GREEN

All measurements are in centimetres.



(a) Calculate the area of the triangle.
Simplify your answer.

(b) Calculate the perimeter of the triangle.
Simplify your answer.

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

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

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

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

AMBER

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

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

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

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

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

GREEN

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

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

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

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

(j) $\frac{(3\sqrt{5}+7)(2\sqrt{5}+1)}{3\sqrt{5}}$ (k) $\frac{(10-\sqrt{2})^2}{2\sqrt{3}}$ (l) $\frac{(5\sqrt{2}+2\sqrt{3})^2}{3+2\sqrt{2}}$

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)	$3(a+5)$	(b)	$5(x-2)$	(c)	$4(2-3f)$
(d)	$h(h-3)$	(e)	$m(3n-2m)$	(f)	$3r(2r-3s)$
(g)	$5(5z+12)+3(5z-2)$	(h)	$r(5r+p)-2r(r+p)$	(i)	$4a(3b+p)-2a(a-p)$
(j)	$(x+2)(x+3)$	(k)	$(x-4)(x+5)$	(l)	$(x-2)(x-5)$

AMBER

Expand and simplify the expressions.

(a)	$(x+3)(x+7)$	(b)	$(x-3)(x+4)$	(c)	$(x-4)(x-2)$
(d)	$(x+6)^2$	(e)	$(x-5)^2$	(f)	$(3x+1)(4x+3)$
(g)	$(2x-3)(3x+7)$	(h)	$(4x-1)(2x+3)$	(i)	$(5+2x)(3x-5)$
(j)	$(3x+2)^2$	(k)	$(2x-7)^2$	(l)	$x(2x+2)(x+3)$

GREEN

Expand and simplify the expressions.

(a)	$(2x+4)(3x-7)$	(b)	$(4y+3)(3y+5)$	(c)	$x(x+5)(x+3)$
(d)	$x(x-8)(x-3)$	(e)	$x(x+4)(x-3)$	(f)	$2x(x-4)(x+7)$
(g)	$3x(2x-1)(x+5)$	(h)	$(x+5)(x+1)(x+2)$	(i)	$(x-4)(x-2)(x+1)$
(j)	$(x+4)^2(x-5)$	(k)	$(2x+5)(3x-2)(x+4)$	(l)	$(2x-3)^2(x-2)$

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) $3a + 12$ (b) $c^2 + 7c$ (c) $6d - d^2$

(d) $18h - 6h^2$ (e) $8k - 8$ (f) $5ab + 10a$

(g) $2w^2 - w^3$ (h) $8x^2 - 12x^3$ (i) $12ab^2 + 18a^2b$

(j) $9x^3y^2 - 6x^4$ (k) $x^2 + 7x + 12$ (l) $x^2 + 8x + 16$

AMBER

Fully factorise the expressions below.

(a) $6ab^2 + 9a^3b$ (b) $4ab + 6b^2 - 2b$ (c) $x^2 + 8x + 12$

(d) $x^2 + 14x + 48$ (e) $x^2 + 15x + 56$ (f) $x^2 - 12x + 27$

(g) $x^2 - 3x + 2$ (h) $x^2 - x - 56$ (i) $x^2 + 4x - 21$

(j) $x^2 - 9x - 10$ (k) $x^2 - 36$ (l) $x^2 - 81$

GREEN

Fully factorise the expressions below.

(a) $4x^2 - 19x + 12$ (b) $2x^2 + x - 6$ (c) $4x^2 - 15x + 9$

(d) $4x^2 + 7x + 3$ (e) $6x^2 + 19x + 10$ (f) $2x^2 - x - 21$

(g) $10x^2 - 11x + 3$ (h) $2x^2 - 10x - 28$ (i) $k^3 + 8k^2 + 12k$

(j) $x^3 - x^2 - 12x$ (k) $2y^3 + 11y^2 + 12y$ (l) $12a^3 + 11a^2 - 5a$

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)	$2x - 3 = 7$	(b)	$8 - 3a = -4$	(c)	$\frac{x}{4} + 2 = 5$
(d)	$2a + 5 = 4a - 1$	(e)	$6x + 4 = 2x + 6$	(f)	$5(4a + 2) = 70$
(g)	$4(2x - 4) = 32$	(h)	$5(a + 4) = 3(a + 6)$	(i)	$2(5x + 2) = 4(2x + 3)$
(j)	$(x - 3)(x + 2) = 0$	(k)	$(x + 4)(x + 7) = 0$	(l)	$(x - 2)(x - 5) = 0$

AMBER

Solve the following equations.

(a)	$(x + 3)(x + 2) = 0$	(b)	$(x + 3)(x + 3) = 0$	(c)	$x^2 + 25x + 24 = 0$
(d)	$x^2 + 29x + 100 = 0$	(e)	$x^2 + 3x - 10 = 0$	(f)	$x^2 + 2x - 35 = 0$
(g)	$x^2 - 6x - 27 = 0$	(h)	$x^2 - 4x - 21 = 0$	(i)	$x^2 - 5x - 14 = 0$
(j)	$x^2 + 14x + 24 = 0$	(k)	$x^2 - 2x - 63 = 0$	(l)	$x^2 + 18x + 56 = 0$

GREEN

Solve the following equations.

(a)	$2x^2 + 11x + 15 = 0$	(b)	$3x^2 + 4x + 1 = 0$	(c)	$5x^2 + 26x + 5 = 0$
(d)	$7x^2 + 20x - 3 = 0$	(e)	$3x^2 - 16x - 12 = 0$	(f)	$3x^2 + 8x - 3 = 0$
(g)	$9x^2 + 9x + 2 = 0$	(h)	$10x^2 + 9x + 2 = 0$	(i)	$12x^2 + 13x + 3 = 0$
(j)	$2x^2 - 41x + 9 = 50 - 8x^2$	(k)	$18x^2 - 7x - 3 = 6x(x - 2)$	(l)	$4x^2 - 2x - 5 = 2x - 2$

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) $y = x^2 + 8x + 1$ (b) $y = x^2 + 10x + 3$ (c) $y = x^2 + 2x - 1$

(d) $y = x^2 - 6x - 10$ (e) $y = x^2 - 4x - 13$ (f) $y = x^2 - 12x + 3$

(g) $y = x^2 + 14x + 3$ (h) $y = x^2 - 2x - 15$ (i) $y = x^2 + 4x - 11$

(j) $y = x^2 - 100x - 25$ (k) $y = x^2 + 3x + 1$ (l) $y = x^2 - 7x - 2$

AMBER

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

(a) $y = x^2 + 4x + 1$ (b) $y = x^2 + 8x - 10$ (c) $y = x^2 + 14x - 4$

(d) $y = x^2 - 8x - 2$ (e) $y = x^2 - 10x + 10$ (f) $y = x^2 + 18x + 7$

(g) $y = x^2 + x - 8$ (h) $y = x^2 - 9x - 1$ (i) $y = x^2 + 11x + 3$

(j) $y = x^2 + x - 7$ (k) $y = x^2 + 3x + 8$ (l) $y = 3x^2 + 12x + 3$

GREEN

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

(a) $y = 2x^2 + 8x + 2$ (b) $y = 2x^2 + 12x - 3$ (c) $y = 3x^2 - 12x + 2$

(d) $y = 4x^2 + 12x - 5$ (e) $y = 2x^2 - 3x - 5$ (f) $y = 5x^2 - 20x + 30$

(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

Topic: Functions

RED

$f(x) = 3x - 7$

Work out the values of the following.

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

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

Work out the values of the following.

(f) $g(2)$ (g) $g(5)$ (h) $g(-3)$ (i) $g\left(\frac{1}{2}\right)$ (j) $g\left(-\frac{3}{4}\right)$

AMBER

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

Work out the values of the following.

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

$g(x) = 4x + 5$

Solve the following equations.

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

GREEN

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

Work out the values of the following.

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

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

Solve the following equations.

(f) $g(x) = 0$ (g) $g(x) = -6$ (h) $g(x) = -12$ (i) $g(x) = 8$ (j) $g(x) = 2$

Mark your work and make corrections.

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

Topic: Simultaneous Equations

RED

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

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

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

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

(d) $2x + 8y = 43$
$x + 3y = 18$

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

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

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

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

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

AMBER

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

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

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

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

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

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

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

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

(h) $x + y = 7$
$xy = 10$

(i) $x^2 + y^2 = 20$
$y = x + 3$

GREEN

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

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

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

(c) $y = -x^2 + 5x + 2$
$y = 3x^2 - x - 2$

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

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

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

(g) $y = x^2 + x - 7$
$4x + 2y + 1 = 0$

(h) $y = x - 2$
$2x^2 - xy = 11$

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

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)	$2x + 1 \leq 9$	(b)	$3x - 5 > 16$	(c)	$5x - 2 \geq 28$
(d)	$1 + \frac{x}{2} \leq 5$	(e)	$\frac{x}{9} - 6 > 4$	(f)	$\frac{x-5}{4} < 2$
(g)	$6(x + 2) < 42$	(h)	$2(2x - 9) \geq 22$	(i)	$2(5x + 1) \leq 36$
(j)	$x + 1 \geq 3x - 18$	(k)	$13x - 12 < 3x + 13$	(l)	$7x - 5 \geq 3x + 11$

AMBER

Solve the following inequalities.

(a)	$7x + 1 > 60$	(b)	$10x - 16 \geq 76$	(c)	$9x + 4 > 7x + 15$
(d)	$6 < x + 3 < 10$	(e)	$4 \leq 2x \leq 7$	(f)	$4 < \frac{x}{5} < 6$
(g)	$9 \leq 2x + 3 \leq 25$	(h)	$-3 \leq \frac{x}{4} - 1 < 0$	(i)	$0 \leq \frac{x-6}{2} < 2$
(j)	$(x - 3)(x + 1) < 0$	(k)	$(x - 6)(x + 7) \geq 0$	(l)	$x^2 - x - 12 > 0$

GREEN

Solve the following inequalities.

(a)	$x(x - 7) < 0$	(b)	$(x - 3)(x - 6) \leq 0$	(c)	$(x + 4)(x - 5) > 0$
(d)	$x^2 + 5x + 6 > 0$	(e)	$x^2 - x - 30 \geq 0$	(f)	$x^2 - 8x + 12 < 0$
(g)	$x^2 > 36$	(h)	$x^2 - 2x \leq 15$	(i)	$6x > x^2 - 8x + 40$
(j)	$4x^2 - 3x - 1 \geq 0$	(k)	$6x^2 - 13x + 7 < 0$	(l)	$15x^2 + 4x - 35 \leq 0$

Mark your work and make corrections.

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