GCSE to A-Level

Transition Pack

Edexcel

Name: .....

Practice makes permanent, and that is especially the case in A-Level Mathematics. This transition pack will focus on the key skills learnt at KS4 that are crucial to be successful at AS-Level through to A-Level.

Transition End of Unit Assessment Hyperlinked Only

1. Algebraic Expressions
Simplifying Expressions

Support Video

1. (a) Simplify $a^4 \times a^5$

(b) Simplify $\dfrac{45e^6 f^8}{5ef^2}$

(c) Write down the value of $9^{\frac{1}{2}}$

2. (a) Simplify $x^7 \times x^3$

(b) Simplify $(m^4)^3$

(c) Simplify $\dfrac{36af^8}{12a^5 f^2}$

3. (*a*) Simplify $(p^3)^2$

(*b*) Simplify $\dfrac{t^8}{t^3}$

4. Simplify $(3x^2y^4)^3$

R A G

Answers

1. (a) a^9

(b) $9e^5f^6$

(c) 3

2. (a) x^{10}

(b) m^{12}

(c) $3a^{-4}f^6$

3. (a) p^6

(b) t^5

4. $27x^6y^{12}$

1. Algebraic Expressions Simplifying Fractions

Support Video

1 Write as sums of powers of x.

a $\dfrac{x^5+1}{x^2}$ **b** $x^2\left(x-\dfrac{1}{x}\right)$ **c** $x^{-4}\left(x^2+\dfrac{1}{x^3}\right)$

d $\dfrac{6x^5+3x^4}{3x^2}$ **e** $\dfrac{5x^5+20x^4}{10x^2}$ **f** $\dfrac{7x^5-5x^4}{2x^6}$

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Answers

1 **a** x^3+x^{-2} **b** x^3-x **c** $x^{-2}+x^{-7}$

d $2x^3+x^2$ **e** $0.5x^3+2x^2$ **f** $3.5x^{-1}-2.5x^{-2}$

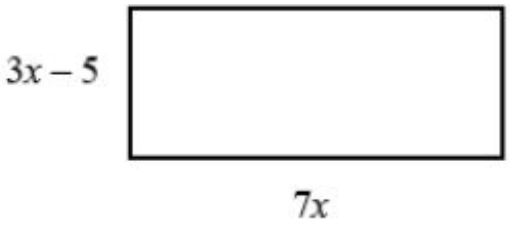
1. Algebraic Expressions
Expanding Double Brackets

Support Video

1 The diagram shows a rectangle.

Write down an expression, in terms of x, for the area of the rectangle.

Show that the area of the rectangle can be written as $21x^2 - 35x$



2 Expand and simplify.

a $(x + 4)(x + 5)$ **b** $(x + 7)(x + 3)$

c $(x + 7)(x - 2)$ **d** $(x + 5)(x - 5)$

e $(2x + 3)(x - 1)$ **f** $(3x - 2)(2x + 1)$

g $(5x - 3)(2x - 5)$ **h** $(3x - 2)(7 + 4x)$

i $(3x + 4y)(5y + 6x)$ **j** $(x + 5)^2$

k $(2x - 7)^2$ **l** $(4x - 3y)^2$

3 Expand and simplify $(x + 3)^2 + (x - 4)^2$

4 Expand and simplify.

a $\left(x+\frac{1}{x}\right)\left(x-\frac{2}{x}\right)$ **b** $\left(x+\frac{1}{x}\right)^2$

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Answers

1 $7x(3x - 5) = 21x^2 - 35x$

2

a $x^2 + 9x + 20$

b $x^2 + 10x + 21$

c $x^2 + 5x - 14$

d $x^2 - 25$

e $2x^2 + x - 3$

f $6x^2 - x - 2$

g $10x^2 - 31x + 15$

h $12x^2 + 13x - 14$

i $18x^2 + 39xy + 20y^2$

j $x^2 + 10x + 25$

k $4x^2 - 28x + 49$

l $16x^2 - 24xy + 9y^2$

3 $2x^2 - 2x + 25$

4

a $x^2 - 1 - \frac{2}{x^2}$

b $x^2 + 2 + \frac{1}{x^2}$

1. Algebraic Expressions
Expanding Trinomials

Support Video

Video title wrong but it is correct

1 Expand and simplify.

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

b $x(x-5)(x-3)$

c $y(x-3)(x+2)$

d $x(2x+1)(4x-1)$

e $y(x-3y+3)(2x+1)$

f $3x(2x-y-3)(2x+y)$

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

h $(3x-2)(7+4x)(x-2)$

i $(x-3)(x-4)(x+5)$

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

k $(x-3y)^3$

l $(2x-5y)^3$

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ANSWERS

1 Expand and simplify.

a $3x^2+6x-24$ **b** x^3-8x^2+15x

c $x^2y-xy-6y$ **d** $8x^3+2x^2-x$

e $2x^2y-6xy^2-3y^2+7xy+3y$ **f** $12x^3-3xy^2-18x^2-9xy$

g $2x^3-9x^2-5x+42$ **h** $12x^3-11x^2-40x+28$

i $x^3-2x^2-23x+60$ **j** $6x^3+8x^2-2x-4$

k $x^3-9x^2y+27xy^2-27y^3$ **l** $8x^3-60x^2y+150xy^2-125y^3$

1. Algebraic Expressions
Factorising Quadratics

Support Video

1 Factorise

a $x^2 + 7x + 12$ **b** $x^2 + 5x - 14$

c $x^2 - 11x + 30$ **d** $x^2 - 5x - 24$

e $x^2 - 7x - 18$ **f** $x^2 + x - 20$

g $x^2 - 3x - 40$ **h** $x^2 + 3x - 28$

2 Factorise fully

a $y^2 - 100$ **b** $36x^2 - 49y^2$

c $4x^2 - 81y^2$ **d** $18a^2 - 200b^2c^2$

3 Factorise fully

a $2x^2 + x - 3$ **b** $6x^2 + 17x + 5$

c $2x^2 + 7x + 3$ **d** $9x^2 - 15x + 4$

e $10x^2 + 21x + 9$ **f** $12x^2 - 38x + 20$

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Answers

1 a $(x+3)(x+4)$ b $(x+7)(x-2)$
c $(x-5)(x-6)$ d $(x-8)(x+3)$
e $(x-9)(x+2)$ f $(x+5)(x-4)$
g $(x-8)(x+5)$ h $(x+7)(x-4)$

2 a $(y-10)(y+10)$ b $(6x-7y)(6x+7y)$
c $(2x-9y)(2x+9y)$ d $2(3a-10bc)(3a+10bc)$

3 a $(x-1)(2x+3)$ b $(3x+1)(2x+5)$
c $(2x+1)(x+3)$ d $(3x-1)(3x-4)$
e $(5x+3)(2x+3)$ f $2(3x-2)(2x-5)$

1. Algebraic Expressions
Simplifying Indices

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1 Simplify.

a $\dfrac{3x^2 \times x^3}{2x^2}$ **b** $\dfrac{10x^5}{2x^2 \times x}$

c $\dfrac{3x \times 2x^3}{2x^3}$ **d** $\dfrac{7x^3y^2}{14x^5y}$

e $\dfrac{y^2}{y^{\frac{1}{2}} \times y}$ **f** $\dfrac{c^{\frac{1}{2}}}{c^2 \times c^{\frac{3}{2}}}$

g $\dfrac{\left(2x^2\right)^3}{4x^0}$ **h** $\dfrac{x^{\frac{1}{2}} \times x^{\frac{3}{2}}}{x^{-2} \times x^3}$

2 Write the following as a single power of x.

a $\dfrac{1}{x}$ **b** $\dfrac{1}{x^7}$ **c** $\sqrt[4]{x}$

d $\sqrt[5]{x^2}$ **e** $\dfrac{1}{\sqrt[3]{x}}$ **f** $\dfrac{1}{\sqrt[3]{x^2}}$

3 Write the following without negative or fractional powers.

a x^{-3} **b** x^0 **c** $x^{\frac{1}{5}}$

d $x^{\frac{2}{5}}$ **e** $x^{-\frac{1}{2}}$ **f** $x^{-\frac{3}{4}}$

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Answers

1 **a** $\frac{3x^3}{2}$ **b** $5x^2$

c $3x$ **d** $\frac{y}{2x^2}$

e $y^{\frac{1}{2}}$ **f** c^{-3}

g $2x^6$ **h** x

2 **a** x^{-1} **b** x^{-7} **c** $x^{\frac{1}{4}}$

d $x^{\frac{2}{5}}$ **e** $x^{-\frac{1}{3}}$ **f** $x^{-\frac{2}{3}}$

3 **a** $\frac{1}{x^3}$ **b** 1 **c** $\sqrt[5]{x}$

d $\sqrt[5]{x^2}$ **e** $\frac{1}{\sqrt{x}}$ **f** $\frac{1}{\sqrt[4]{x^3}}$

1. Algebraic Expressions
Simplifying Surds

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1 Simplify.

a $\sqrt{45}$ **b** $\sqrt{125}$

c $\sqrt{48}$ **d** $\sqrt{175}$

e $\sqrt{300}$ **f** $\sqrt{28}$

g $\sqrt{72}$ **h** $\sqrt{162}$

2 Simplify.

a $\sqrt{72}+\sqrt{162}$ **b** $\sqrt{45}-2\sqrt{5}$

c $\sqrt{50}-\sqrt{8}$ **d** $\sqrt{75}-\sqrt{48}$

e $2\sqrt{28}+\sqrt{28}$ **f** $2\sqrt{12}-\sqrt{12}+\sqrt{27}$

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Answers

1 a $3\sqrt{5}$ b $5\sqrt{5}$ c $4\sqrt{3}$ d $5\sqrt{7}$ e $10\sqrt{3}$ f $2\sqrt{7}$ g $6\sqrt{2}$ h $9\sqrt{2}$

2 a $15\sqrt{2}$ b $\sqrt{5}$ c $3\sqrt{2}$ d $\sqrt{3}$

1. Algebraic Expressions Brackets and Surds

Support Video

1 Expand and simplify.

a $(\sqrt{2}+\sqrt{3})(\sqrt{2}-\sqrt{3})$

b $(3+\sqrt{3})(5-\sqrt{12})$

c $(4-\sqrt{5})(\sqrt{45}+2)$

d $(5+\sqrt{2})(6-\sqrt{8})$

2 Expand and simplify $\left(\sqrt{x}+\sqrt{y}\right)\left(\sqrt{x}-\sqrt{y}\right)$

3 Work out the value of $\left(\sqrt{2}+\sqrt{8}\right)^2$

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

Give your answer in the form $a+b\sqrt{2}$ where a and b are integers.

Answers

1 **a** -1 **b** $9-\sqrt{3}$ **c** $10\sqrt{5}-7$ **d** $26-4\sqrt{2}$

2 $x-y$

3 18

4 $1+2\sqrt{2}$

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1. Algebraic Expressions
Rationalising the Denominator

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1 Rationalise and simplify, if possible.

a $\frac{1}{\sqrt{5}}$ **b** $\frac{1}{\sqrt{11}}$

c $\frac{2}{\sqrt{7}}$ **d** $\frac{2}{\sqrt{8}}$

e $\frac{2}{\sqrt{2}}$ **f** $\frac{5}{\sqrt{5}}$

g $\frac{\sqrt{8}}{\sqrt{24}}$ **h** $\frac{\sqrt{5}}{\sqrt{45}}$

2 Rationalise and simplify.

a $\frac{1}{3-\sqrt{5}}$ **b** $\frac{2}{4+\sqrt{3}}$ **c** $\frac{6}{5-\sqrt{2}}$

3 Rationalise and simplify, if possible.

a $\frac{1}{\sqrt{9}-\sqrt{8}}$ **b** $\frac{1}{\sqrt{x}-\sqrt{y}}$

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Answers

1 **a** $\frac{\sqrt{5}}{5}$ **b** $\frac{\sqrt{11}}{11}$

c $\frac{2\sqrt{7}}{7}$ **d** $\frac{\sqrt{2}}{2}$

e $\sqrt{2}$ **f** $\sqrt{5}$

g $\frac{\sqrt{3}}{3}$ **h** $\frac{1}{3}$

2 **a** $\frac{3+\sqrt{5}}{4}$ **b** $\frac{2(4-\sqrt{3})}{13}$ **c** $\frac{6(5+\sqrt{2})}{23}$

3 **a** $3+2\sqrt{2}$ **b** $\frac{\sqrt{x}+\sqrt{y}}{x-y}$

2. Quadratics
Solving Quadratics - Factorising

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1 Solve

a $6x^2 + 4x = 0$

b $28x^2 - 21x = 0$

c $x^2 + 7x + 10 = 0$

d $x^2 - 5x + 6 = 0$

e $x^2 - 3x - 4 = 0$

f $x^2 + 3x - 10 = 0$

g $x^2 - 10x + 24 = 0$

h $x^2 - 36 = 0$

i $x^2 + 3x - 28 = 0$

j $x^2 - 6x + 9 = 0$

k $2x^2 - 7x - 4 = 0$

l $3x^2 - 13x - 10 = 0$

2 Solve

a $x^2 - 3x = 10$

b $x^2 - 3 = 2x$

c $x^2 + 5x = 24$

d $x^2 - 42 = x$

e $x(x + 2) = 2x + 25$

f $x^2 - 30 = 3x - 2$

g $x(3x + 1) = x^2 + 15$

h $3x(x - 1) = 2(x + 1)$

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Answers

1 **a** $x = 0$ or $x = -\frac{2}{3}$ **b** $x = 0$ or $x = \frac{3}{4}$

c $x = -5$ or $x = -2$ **d** $x = 2$ or $x = 3$

e $x = -1$ or $x = 4$ **f** $x = -5$ or $x = 2$

g $x = 4$ or $x = 6$ **h** $x = -6$ or $x = 6$

i $x = -7$ or $x = 4$ **j** $x = 3$

k $x = -\frac{1}{2}$ or $x = 4$ **l** $x = -\frac{2}{3}$ or $x = 5$

2 **a** $x = -2$ or $x = 5$ **b** $x = -1$ or $x = 3$

c $x = -8$ or $x = 3$ **d** $x = -6$ or $x = 7$

e $x = -5$ or $x = 5$ **f** $x = -4$ or $x = 7$

g $x = -3$ or $x = 2\frac{1}{2}$ **h** $x = -\frac{1}{3}$ or $x = 2$

2. Quadratics
Solving Quadratics - Quadratic Formula

Support Video

1 Solve, giving your solutions in surd form.

a $3x^2 + 6x + 2 = 0$ **b** $2x^2 - 4x - 7 = 0$

2 Solve the equation $x^2 - 7x + 2 = 0$

Give your solutions in the form $\frac{a \pm \sqrt{b}}{c}$, whe

3 Solve $10x^2 + 3x + 3 = 5$

Give your solution in surd form.

4 Choose an appropriate method to solve each quadratic equation, giving your answer in surd form when necessary.

a $4x(x - 1) = 3x - 2$

b $10 = (x + 1)^2$

c $x(3x - 1) = 10$

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Answers

1 **a** $x = -1 + \frac{\sqrt{3}}{3}$ or $x = -1 - \frac{\sqrt{3}}{3}$ **b** $x = 1 + \frac{3\sqrt{2}}{2}$ or $x = 1 - \frac{3\sqrt{2}}{2}$

2 $x = \frac{7 + \sqrt{41}}{2}$ or $x = \frac{7 - \sqrt{41}}{2}$

3 $x = \frac{-3 + \sqrt{89}}{20}$ or $x = \frac{-3 - \sqrt{89}}{20}$

4 **a** $x = \frac{7 + \sqrt{17}}{8}$ or $x = \frac{7 - \sqrt{17}}{8}$

b $x = -1 + \sqrt{10}$ or $x = -1 - \sqrt{10}$

c $x = -1\frac{2}{3}$ or $x = 2$

2. Quadratics
Completing the square

Support Video

1 Complete the square for the following expressions:

a $x^2 + 8x$ **b** $x^2 - 10x$ **c** $x^2 - x$

d $3x^2 - 15x$ **e** $12x - 2x^2$

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Answers

1 Solve by completing the square.

a $(x+4)^2 - 16$ **b** $(x-5)^2 - 25$ **c** $\left(x - \frac{1}{2}\right)^2 - \frac{1}{4}$

d $3\left(x - \frac{5}{2}\right)^2 - \frac{75}{4}$ **e** $-2(x-3)^2 + 18$

2. Quadratics
Solving by completing the square

Support Video

1 Solve by completing the square.

a $x^2 - 4x - 3 = 0$

b $x^2 - 10x + 4 = 0$

c $x^2 + 8x - 5 = 0$

d $x^2 - 2x - 6 = 0$

e $2x^2 + 8x - 5 = 0$

f $5x^2 + 3x - 4 = 0$

2 Solve by completing the square.

a $(x - 4)(x + 2) = 5$

b $2x^2 + 6x - 7 = 0$

c $x^2 - 5x + 3 = 0$

Answers

1 **a** $x = 2 + \sqrt{7}$ or $x = 2 - \sqrt{7}$ **b** $x = 5 + \sqrt{21}$ or $x = 5 - \sqrt{21}$

c $x = -4 + \sqrt{21}$ or $x = -4 - \sqrt{21}$ **d** $x = 1 + \sqrt{7}$ or $x = 1 - \sqrt{7}$

e $x = -2 + \sqrt{6.5}$ or $x = -2 - \sqrt{6.5}$ **f** $x = \frac{-3 + \sqrt{89}}{10}$ or $x = \frac{-3 - \sqrt{89}}{10}$

2 **a** $x = 1 + \sqrt{14}$ or $x = 1 - \sqrt{14}$ **b** $x = \frac{-3 + \sqrt{23}}{2}$ or $x = \frac{-3 - \sqrt{23}}{2}$

c $x = \frac{5 + \sqrt{13}}{2}$ or $x = \frac{5 - \sqrt{13}}{2}$

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2. Quadratics
Substituting into functions

Support Video

Video title wrong but it is correct

1. f and g are functions such that

$$f(x) = \frac{2}{x^2} \qquad \text{and} \qquad g(x) = 4x^2$$

(*a*) Find f(–5)

(*b*) Find the value of x for which $f(x) = g(x)$.

2. The function $f(x) = 3x^2 - 2x - 8$

Express $f(x + 2)$ in the form $ax^2 + bx$

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Answers

1. (*a*) $\frac{2}{25}$

(*b*) $x = \pm 1$

2. $3x^2 + 10x$

2. Quadratics
Sketching Quadratics

Support Video

1 Sketch the graph of $y = -x^2$

2 Sketch each graph, labelling where the curve crosses the axes.

a $y = (x + 2)(x - 1)$ **b** $y = x(x - 3)$ **c** $y = (x + 1)(x + 5)$

3 Sketch each graph, labelling where the curve crosses the axes.

a $y = x^2 - x - 6$ **b** $y = x^2 - 5x + 4$ **c** $y = x^2 - 4$

d $y = x^2 + 4x$ **e** $y = 9 - x^2$ **f** $y = x^2 + 2x - 3$

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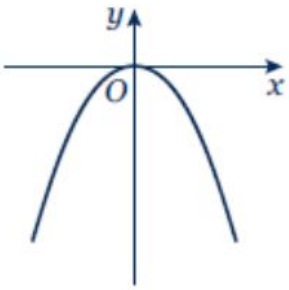
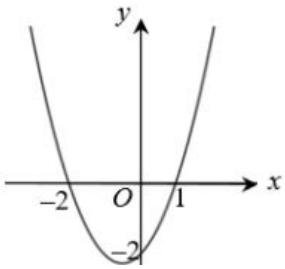
Answers

12

1



2 **a**



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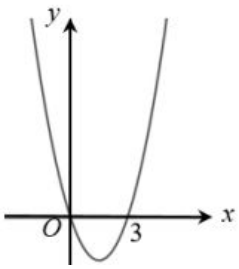

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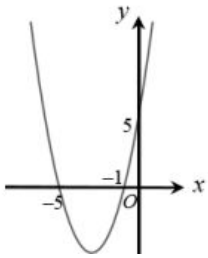

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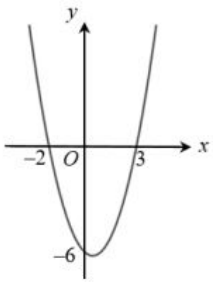

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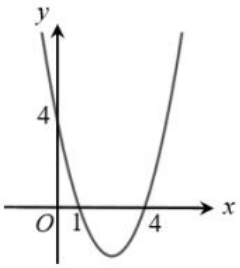

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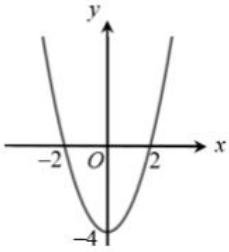

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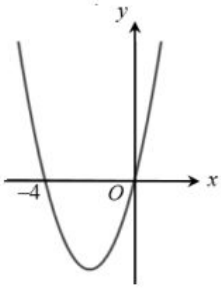

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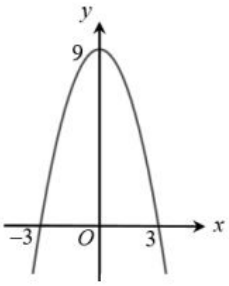

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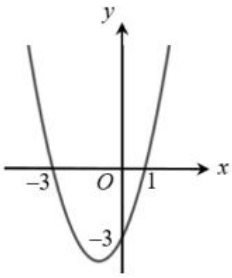

3. Equations and Inequalities
Simultaneous Equations

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Solve these simultaneous equations.

1 $4x + y = 8$
$x + y = 5$

2 $3x + y = 7$
$3x + 2y = 5$

3 $4x + y = 3$
$3x - y = 11$

4 $3x + 4y = 7$
$x - 4y = 5$

5 $2x + y = 11$
$x - 3y = 9$

6 $2x + 3y = 11$
$3x + 2y = 4$

7 $4x + y = 25$
$x - 3y = 16$

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Answers

1 $x = 1, y = 4$

2 $x = 3, y = -2$

3 $x = 2, y = -5$

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

5 $x = 6, y = -1$

6 $x = -2, y = 5$

7 $x = 7, y = -3$

3. Equations and Inequalities
Non-Linear Simultaneous Equations

Support Video

Solve these simultaneous equations.

1 $xy = 9$ and $y = x$

2 $x^2 + y^2 = 50$ and $y = x$

3 $xy - 3 = 16$ and $x - 19y = 0$

4 $x - 2y = 3$ and $(x-4)^2 + (y-3)^2 = 25$

RAG

Answers

1 $x = -3,\ y = -3$ and $x = 3,\ y = 3$

2 $x = -5,\ y = -5$ and $x = 5,\ y = 5$

3 $x = -19,\ y = -1$ and $x = 19,\ y = 1$

4 $x = 1,\ y = -1$ and $x = 9,\ y = 3$

3. Equations and Inequalities
Linear Inequalities

Support Video

1 Solve these inequalities

a $4x > 16$ **b** $5x - 7 \leq 3$ **c** $1 \geq 3x + 4$

d $5 - 2x < 12$ **e** $\frac{x}{2} \geq 5$ **f** $8 < 3 - \frac{x}{3}$

2 Solve these inequalities

a $\frac{x}{5} < -4$ **b** $10 \geq 2x + 3$ **c** $7 - 3x > -5$

3 Solve

a $2 - 4x \geq 18$ **b** $3 \leq 7x + 10 < 45$ **c** $6 - 2x \geq 4$

d $4x + 17 < 2 - x$ **e** $4 - 5x < -3x$ **f** $-4x \geq 24$

4 Solve these inequalities

a $3t + 1 < t + 6$ **b** $2(3n - 1) \geq n + 5$

5 Solve

a $3(2 - x) > 2(4 - x) + 4$ **b** $5(4 - x) > 3(5 - x) + 2$

R A G

Answers

1 **a** $x > 4$ **b** $x \leq 2$ **c** $x \leq -1$

d $x > -\frac{7}{2}$ **e** $x \geq 10$ **f** $x < -15$

2 **a** $x < -20$ **b** $x \leq 3.5$ **c** $x < 4$

3 **a** $x \leq -4$ **b** $-1 \leq x < 5$ **c** $x \leq 1$

d $x < -3$ **e** $x > 2$ **f** $x \leq -6$

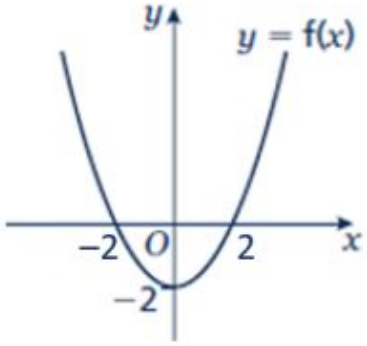
4 **a** $t < \frac{5}{2}$ **b** $n \geq \frac{7}{5}$

5 **a** $x < -6$ **b** $x < \frac{3}{2}$

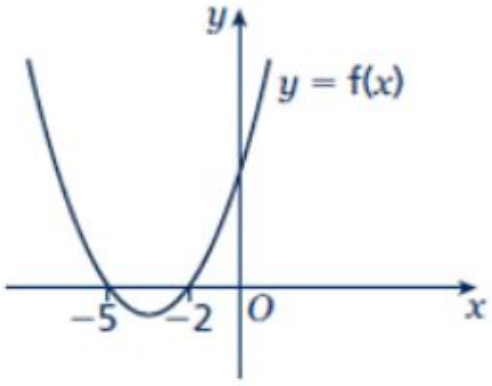
4. Graphs and Transformations
Translating Quadratics

Support Video

1 The graph shows the function $y = f(x)$.
Copy the graph and on the same axes sketch and label the graphs of $y = f(x) + 4$ and $y = f(x + 2)$.

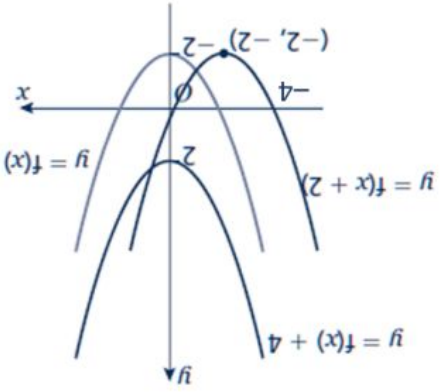


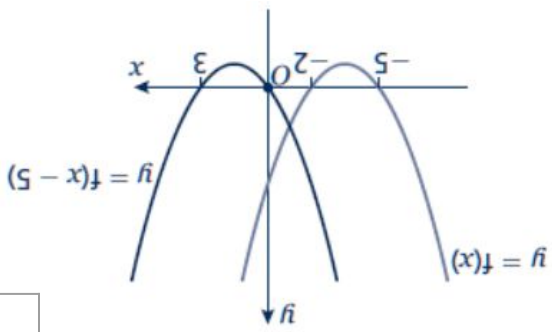
2 The graph shows the function $y = f(x)$.
Copy the graph and on the same axes sketch the graph of $y = f(x - 5)$.



R A G

Answers





4. Graphs and Transformations
Stretching Quadratics

Support Video

1

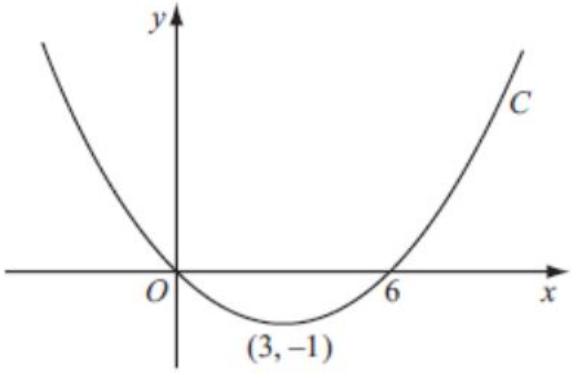


Figure 1

Figure 1 shows a sketch of the curve C with equation $y = f(x)$.
The curve C passes through the origin and through (6, 0).
The curve C has a minimum at the point (3, –1).

On separate diagrams, sketch the curve with equation

(*a*) $y = f(2x)$,

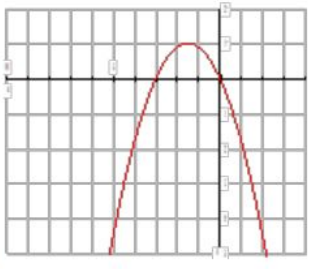
(*b*) $y = -f(x)$,

On each diagram show the coordinates of any points where the curve intersects the x-axis and of any minimum or maximum points.

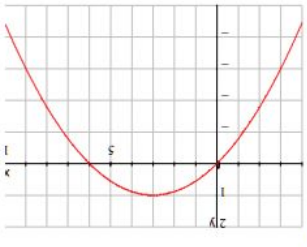
R A G

Answer

(a) (3, 0) (1.5, −1)



(b) (0, 0) and (6, 0) (3, 1)



5. Straight Line Graphs
Finding the gradient from 2 points (1)

Support Video

1 Work out the gradient of the line joining each pair of coordinates.

a (4, 5), (10, 17)

b (0, 6), (–4, 8)

c (–1, –7), (5, 23)

d (3, 10), (4, 7)

R A G

Answers

1 **a** $m = 2$ **b** $m = -\frac{1}{2}$ **c** $m = 5$ **d** $m = -3$

5. Straight Line Graphs
Finding the the equation of a line

Support Video

1 Find the equation of the line with:

a) gradient 2 that passes through the point (1, -1).
b) gradient -0.5 that passes through the point (10,1).
c) gradient 5 that passes through the point (2, 8).
d) gradient -3 that passes through the point (-3, 28).

R A G

Answers

1 a $y = 2x - 3$ b $y = -\frac{1}{2}x + 6$ c $y = 5x - 2$ d $y = -3x + 19$

5. Straight Line Graphs
Perpendicular Lines and Parallel Lines

Support Video

1 Work out whether these pairs of lines are parallel, perpendicular or neither.

a $y = 2x + 3$
$y = 2x - 7$

b $y = 3x$
$2x + y - 3 = 0$

c $y = 4x - 3$
$4y + x = 2$

d $3x - y + 5 = 0$
$x + 3y = 1$

e $2x + 5y - 1 = 0$
$y = 2x + 7$

f $2x - y = 6$
$6x - 3y + 3 = 0$

2 Find the equation of the line parallel to each of the given lines and which passes through each of the given points.

a $y = 3x + 1 \quad (3, 2)$

b $y = 3 - 2x \quad (1, 3)$

c $2x + 4y + 3 = 0 \quad (6, -3)$

d $2y - 3x + 2 = 0 \quad (8, 20)$

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Answers

1 a Parallel b Neither c Perpendicular
d Perpendicular e Neither f Parallel

2 a $y = 3x - 7$ b $y = -2x + 5$
c $y = -\frac{1}{2}x$ d $y = \frac{3}{2}x + 8$

6. Algebraic Methods
Simplifying Algebraic Fractions

Support Video

1 Simplify the algebraic fractions.

a $\dfrac{2x^2+4x}{x^2-x}$

b $\dfrac{x^2+3x}{x^2+2x-3}$

c $\dfrac{x^2-2x-8}{x^2-4x}$

d $\dfrac{x^2-5x}{x^2-25}$

e $\dfrac{x^2-x-12}{x^2-4x}$

f $\dfrac{2x^2+14x}{2x^2+4x-70}$

2 Simplify

a $\dfrac{9x^2-16}{3x^2+17x-28}$

b $\dfrac{2x^2-7x-15}{3x^2-17x+10}$

c $\dfrac{4-25x^2}{10x^2-11x-6}$

d $\dfrac{6x^2-x-1}{2x^2+7x-4}$

R A G

Answers

1 a $\dfrac{2(x+2)}{x-1}$ b $\dfrac{x}{x}$ c $\dfrac{x+2}{x}$ d $\dfrac{x+5}{x}$ e $\dfrac{x+3}{x}$ f $\dfrac{x-5}{x}$

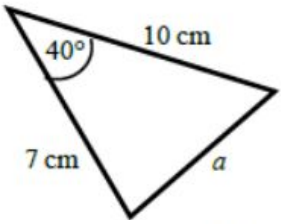
2 a $\dfrac{3x+4}{x+7}$ b $\dfrac{2x+3}{3x-2}$ c $\dfrac{2-5x}{2x-3}$ d $\dfrac{3x+1}{x+4}$

7. Trigonometry
The Cosine Rule

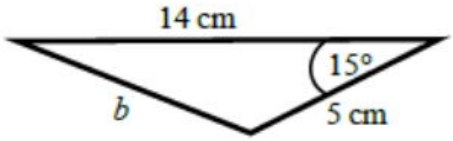
Support Video

Work out the length of the unknown side in each triangle.
Give your answers correct to 3 significant figures.

a

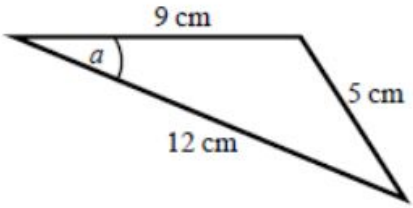


b

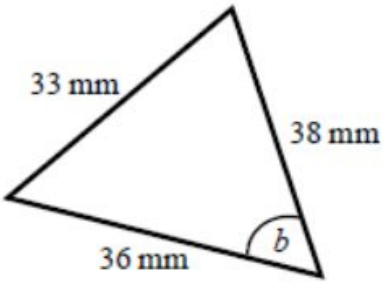


Calculate the angles labelled θ in each triangle.
Give your answer correct to 1 decimal place.

a

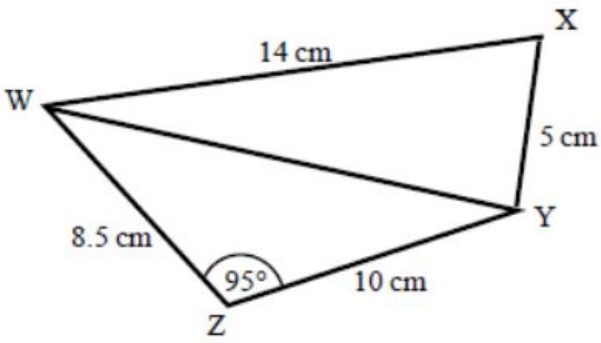


b



a Work out the length of WY.
Give your answer correct to
3 significant figures.

b Work out the size of angle WXY.
Give your answer correct to
1 decimal place.



R A G

Answers

1 **a** 22.2° **b** 52.9°

2 **a** 13.7 cm **b** 76.0°

Answers

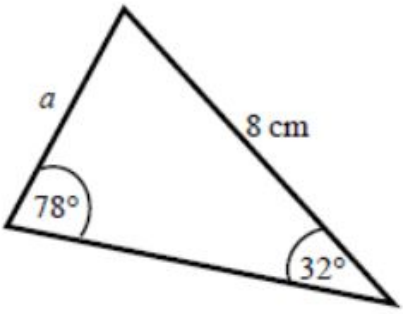
6 **a** 6.46 cm **b** 9.26 cm

7. Trigonometry
The Sine Rule
Cosine, Sine Rule, Area

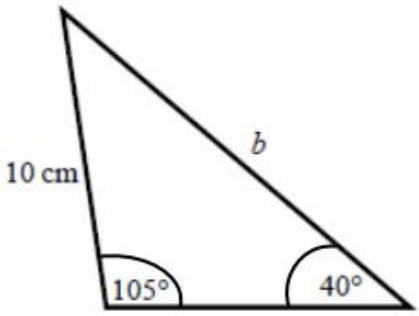
Support Video

1 Find the length of the unknown side in each triangle.
Give your answers correct to 3 significant figures.

a

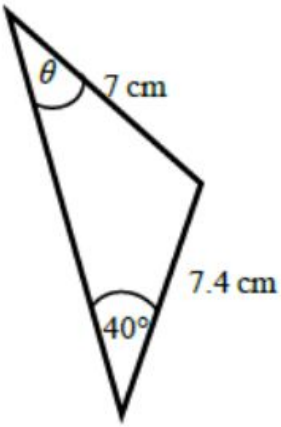


b

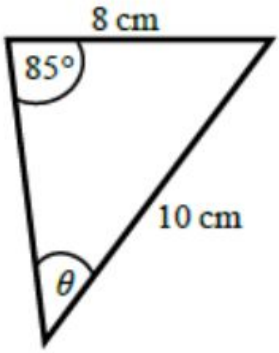


1 Calculate the angles labelled θ in each triangle.
Give your answer correct to 1 decimal place.

a



b



R A G

Answers

1 a 4.33 cm b 15.0 cm

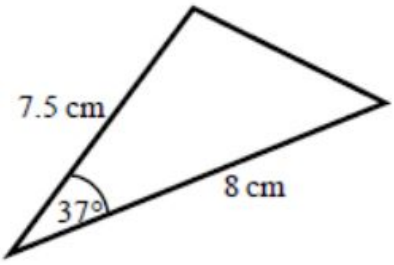
a 42.8° b 52.8°

7. Trigonometry
Area of Triangle

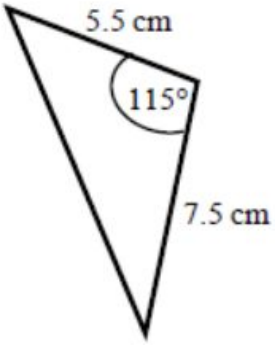
Support Video

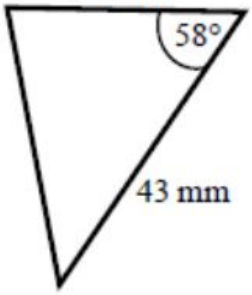
1 Work out the area of each triangle.
Give your answers correct to 3 significant figures.

a

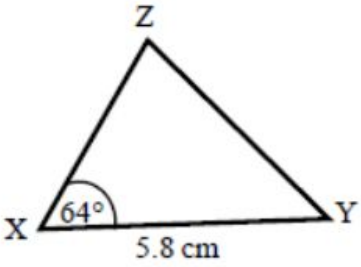


b





2 The area of triangle XYZ is 13.3 cm^2.
Work out the length of XZ.



Hint:

Rearrange the formula to make a side the subject.

R A G

Answers

1 a 18.1 cm^2 b 18.7 cm^2 c 693 mm^2

2 5.10 cm

8. Vectors
Adding Vectors

Support Video

1

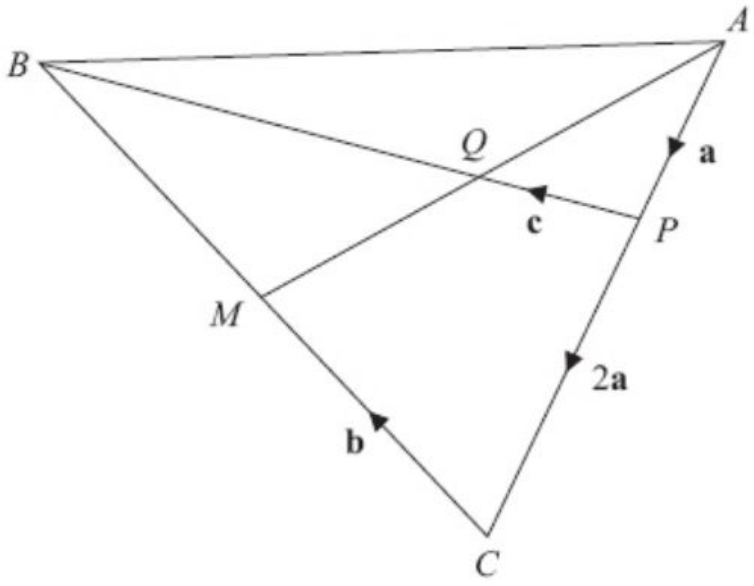


Diagram **NOT** accurately drawn

M is the midpoint of BC.

Q is the midpoint of AM.

$\overrightarrow{AP} = \mathbf{a}$ $\overrightarrow{PC} = 2\mathbf{a}$ $\overrightarrow{CM} = \mathbf{b}$ $\overrightarrow{PQ} = \mathbf{c}$

(a) Find $\overrightarrow{AM}$ in terms of **a** and **b**.

(b) Find $\overrightarrow{QB}$ in terms of **c**.

R A G

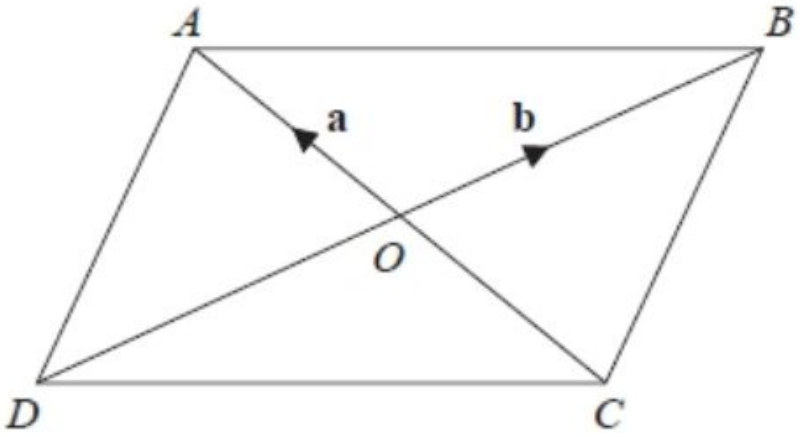
Answers

1 (a) $3\mathbf{a} + \mathbf{b}$ (b) $3\mathbf{c}$

8. Vectors
Adding Vectors Continued

Support Video

1



ABCD is a parallelogram.
The diagonals of the parallelogram intersect at *O*.

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$

(a) Find, in terms of **b**, the vector $\overrightarrow{DB}$.

(b) Find, in terms of **a** and **b**, the vector $\overrightarrow{AB}$.

(c) Find, in terms of **a** and **b**, the vector $\overrightarrow{AD}$.

R A G

Answers

1 (a) 2b (b) b – a (c) – a – b

8. Vectors
Vectors and midpoints

Support Video

1

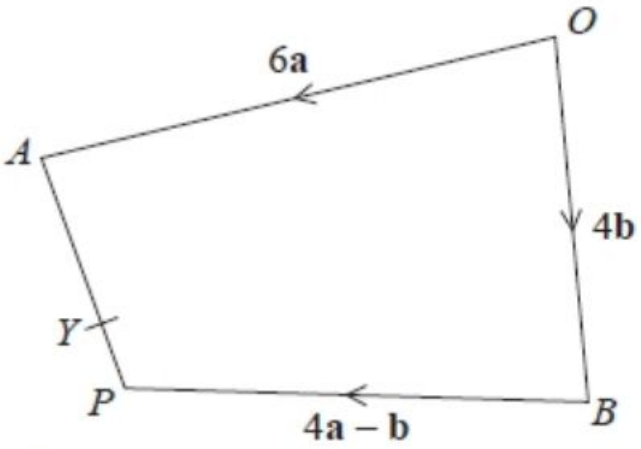


Diagram **NOT** accurately drawn

OBPA is a quadrilateral.

$\overrightarrow{OA} = \mathbf{6a}$

$\overrightarrow{OB} = \mathbf{4b}$

$\overrightarrow{BP} = \mathbf{4a - b}$

Y is the point on *AP* such that $AY : YP = 2 : 1$

Show that $\overrightarrow{OY}$ is parallel to the vector $7\mathbf{a} + 3\mathbf{b}$

R A G

ANSWERS

1 $\frac{2}{3}(7\mathbf{a} + 3\mathbf{b})$