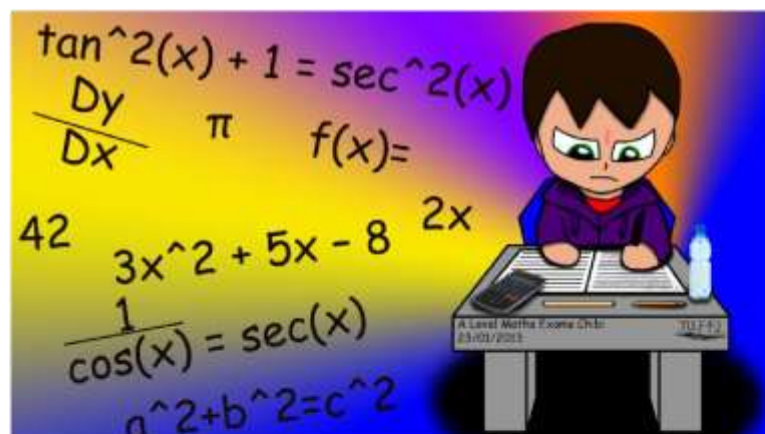


Huish Sixth

MATHS Department



Introduction to A-Level Maths

ANSWER BOOKLET PART 1

Expanding brackets and simplifying expressions Answers

1 a $6x - 3$ b $-10pq - 8q^2$ c $-3xy + 2y^2$

2 a $21x + 35 + 12x - 48 = 33x - 13$ b $40p - 16 - 12p - 27 = 28p - 43$ c $27s + 9 - 30s + 50 = -3s + 59 = 59 - 3s$ d $8x - 6 - 3x - 5 = 5x - 11$

3 a $12x^2 + 24x$ b $20k^3 - 48k$ c $10h - 12h^3 - 22h^2$ d $21s^2 - 21s^3 - 6s$

4 a $-y^2 - 4$ b $5x^2 - 11x$ c $2p - 7p^2$ d $6b^2$

5 $y - 4$

6 a $-1 - 2m$ b $5p^3 + 12p^2 + 27p$

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

8 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 $16x^2 - 24xy + 9y^2$

9 $2x^2 - 2x + 25$

10 a $x^2 - -1 \text{ --- } x^2$ b $x^2 + +2 \text{ --- } x^2$

Surds and rationalising the denominator

Answers

- 1 a $35\sqrt{\quad}$ b c 4 3 d e 10 3 $5\sqrt{\quad}$
 f $g\sqrt{6}2$ h $5\sqrt{\quad}$
 $\sqrt{\quad}$ $2\sqrt{\quad}$
- 2 a $152\sqrt{\quad}$ b c 3 2 d $9\sqrt{2}$
 e 6 7 f 5 3 $\sqrt{5}$
 $\sqrt{\quad}$ $\sqrt{3}$
- 3 a $-1\sqrt{\quad}$ b d $\sqrt{\quad}$
 c $10\sqrt{5}7-$
- 4 a $\sqrt{\quad}$ b c d e f $93\sqrt{\quad}$
 $2642\sqrt{\quad}$
 5 $\frac{\sqrt{11}}{11}$
 g h $\frac{\sqrt{5}}{5}$ $\frac{\sqrt{2}}{2}$
 $\frac{2\sqrt{\quad}}{7}$ 3 $\frac{\sqrt{2}}{2}$
 $\frac{\sqrt{3}}{3}$ $\frac{1}{3}$
- 5 a $3+\frac{5\sqrt{\quad}}{4}$ b $\frac{2(\sqrt{\quad}-3)}{13}$ c $\frac{6(\sqrt{5}+2)}{23}$
- 6 $x-y$
- 7 a $3222+\sqrt{\quad}$ b $\frac{\sqrt{x}+\sqrt{y}}{xy}$

Rules of indices

Answers

- 1 a 1 b 1 c 1 d 1
- 2 a 7 b 4 c 5 d 2
- 3 a 125 b 32 c 343 d 8
- 4 a $\frac{1}{25}$ b $\frac{1}{64}$ c $\frac{1}{32}$ d $\frac{1}{36}$

5 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

6 a $\frac{1}{2}$ b $\frac{1}{9}$ c $\frac{8}{3}$ d $\frac{1}{4}$ e $\frac{4}{3}$ f $\frac{16}{9}$

7 a x^{-1} b x^{-7} c $x^{\frac{1}{4}}$
d $x^{\frac{2}{5}}$ e $x^{-\frac{1}{3}}$ f $x^{-\frac{2}{3}}$

8 a $\frac{1}{x^3}$ b 1 c $\sqrt[5]{x}$
d $\sqrt[5]{x^2}$ e \sqrt{x} f $\frac{1}{\sqrt[4]{x^3}}$

9 a $5x^{\frac{1}{2}}$ b $2x^{-3}$ c $\frac{1}{3x^{-4}}$
d $x^{\frac{1}{2}}$ e 2^x f 4^x g $3x^0$

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

Factorising expressions

Answers

1 a $2x^3y^3(3x - 5y)$ b $7a^3b^2(3b^3 + 5a^2)$
c $5x^2y^2(5 - 2x + 3y)$

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

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

4 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 $2(3x - 2)(2x - 5)$

				$\frac{2x+3}{3x-2}$
				$\frac{3x+1}{x}$
		$\frac{2(x+2)}{x-1}$		
5	a	$\frac{x+2}{x}$		b $\frac{x-1}{x}$
	c	$\frac{x+3}{x}$		d $\frac{x+5}{x}$
	e	$\frac{x+3}{x}$		f $\frac{x-5}{x-5}$
6	a	$3x^{+4}$	b	$x+7$
	c	25^{-x}	d	$2x-3 \quad x+4$
7		$(x+5)$		
8		$4(x+2) \quad x-2$		

Completing the square

Answers

1	a	$(x+2)^2 - 1$	b	$(x-5)^2 - 28$
	c	$(x-4)^2 - 16$	d	$(x+3)^2 - 9$
	e	$(x-1)^2 + 6$		3_2
	f	$\square\square x + \square$		$\frac{\square}{2\square\square}$
		-174		

□

2 a $2(x-2)^2 - 24$

b $4(x-1)^2 - 20$

3^2

c $3(x+2)^2 - 21$

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

252

1^2

3 a $2(x+4)^2 + 398$

3^2

3^2

b $3(x-3)^2 - 13$

5^2

5^2

$5(x+10)^2 - 209$

c 209

$3(x+6)^2 + 1211$

d $+1211$

4 $(5x+3)^2 + 3$

Solving quadratic equations 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 $x = 2$

3 a $x = 2 + 7\sqrt{x}$ or $x = 2 - 7\sqrt{x}$ b $x = 5 + 21$ or $x = \sqrt{-21}$ c $x = -4 + 21$ or $x =$

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

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

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

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

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

6 $x = 7 + \frac{\sqrt{x}}{41}$ or $x = 7 - \frac{\sqrt{x}}{41}$

7 $x = \frac{- + 3\sqrt{89}}{20}$ or $x = \frac{- - 3\sqrt{89}}{20}$

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

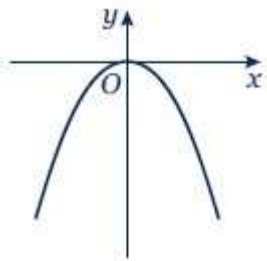
b $x = -1 + 10\sqrt{x}$ or $x = -1 - 10\sqrt{x}$

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

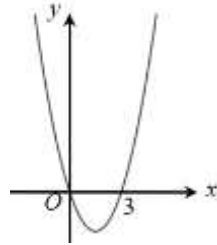
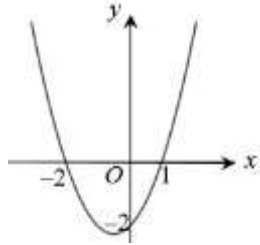
Sketching quadratic graphs

Answers

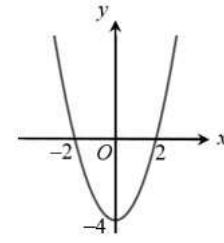
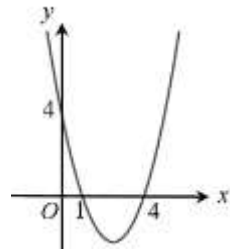
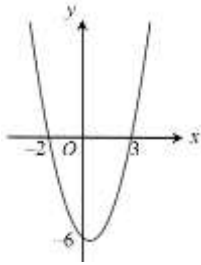
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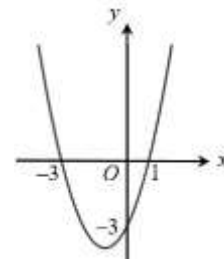
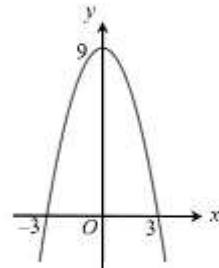
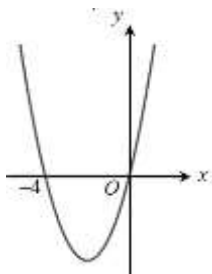
2 a b c



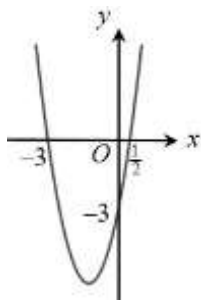
3 a b c



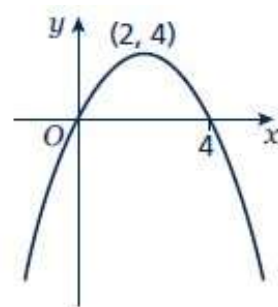
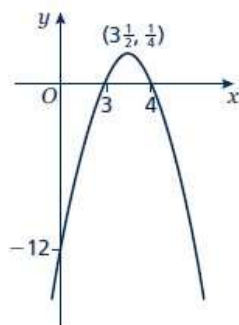
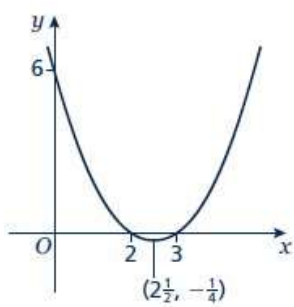
d e f



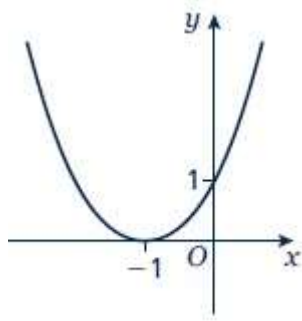
4



5 a b c



6



Line of symmetry at $x = -1$.

Solving linear simultaneous equations 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 $x = 9, y = 5$

8 $x = -2, y = -7$

9 $x = \frac{1}{2}, y = 3\frac{1}{2}$

10 $x = \frac{1}{2}, y = 3$

11 $x = -4, y = 5$

12 $x = -2, y = -5$

13 $x = \frac{1}{4}, y = 1\frac{3}{4}$

14 $x = -2, y = 2\frac{1}{2}$

15 $x = -2\frac{1}{2}, y = 5\frac{1}{2}$

Solving linear and quadratic simultaneous equations

Answers

1 $x = 1, y = 3$

$\frac{9}{5}, \frac{13}{5}$

$x = -\frac{1}{5}, y = -\frac{1}{5}$

2 $x = 2, y = 4$ $x = 4, y = 2$

3 $x = 1, y = -2$

$x = 2, y = -1$

4 $x = 4, y = 1$

$$x = \frac{16}{5}, y = \frac{13}{5}$$

5 $x = 5$

5 $x = 3, y = 4$

$$x = 2, y = 1$$

6 $x = 7, y = 2$

$$x = -1, y = -6$$

7 $x = 0, y = 5$

$$x = -5, y = 0$$

8 $x = -\frac{8}{3}, y = -\frac{19}{3}$

$$x = 3, y = 5$$

9 $x = -2, y = -4$

$$x = 2, y = 4$$

10 $x = \frac{5}{2}, y = 6$

$$x = 3, y = 5$$

11 $x = \frac{15 + \sqrt{15}}{2}, y = \frac{\sqrt{15}}{2}$
 $= \frac{-15 + \sqrt{15}}{2}, y = \frac{\sqrt{15}}{2}$

$$x = 15, y = -15$$

12 $x = \frac{-1 + \sqrt{17}}{2}, y = \frac{\sqrt{17}}{2}$
 $x = \frac{3 + 7}{2}, y = \frac{\sqrt{17}}{2}$

$$x = -17, y = 3 - 7$$

Solving simultaneous equations graphically

Answers

1 a $x = 2, y = 5$

2 a $x = -2, y = 2$

b $x = 2, y = -3$
 $y = 0.5$ **c** $x = -0.5, y = 2.5$
 $y = -2$

b $x = 0.5,$
c $x = -1,$

3 a $x = 1, y = 0$ and $x = 4, y = 3$ **b** $x = -2, y = 7$ and $x = 2, y = -5$
c $x = -2, y = 5$ and $x = -1, y = 4$

4 $x = -3, y = 4$ and $x = 4, y = -3$

5 a i $x = 2.5, y = -2$ and $x = -0.5, y = 4$ **ii** $x = 2.41, y = -1.83$
and $x = -0.41, y = 3.83$

b Solving algebraically gives the more accurate solutions as the solutions from the graph are only estimates, based on the accuracy of your graph.

Linear inequalities

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** $x < \frac{3}{2}$

6 $x > 5$ (which also satisfies $x > 3$)

Quadratic inequalities

Answers

1 $-7 \leq x \leq 4$ **2** $x \leq -2$ or $x \geq 6$ **3** $\frac{1}{2} \leq x \leq 3$ **4** $x < -\frac{3}{2}$ or $x > \frac{1}{2}$

5 $-3 \leq x \leq 4$ **6** $-3 \leq x \leq 2$ **7** $2 < x < 2\frac{1}{2}$ **8** $x \leq -\frac{3}{2}$ or $x \geq \frac{5}{3}$