Daily Practice 30.11.15

Q1. State the equation of the line that passes through (0, 8) and (3, 1)

(x_1, y_1) (x_2, y_2)

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-8}{3-0} = \frac{-7}{3}$

$y = -\frac{7}{3}x + 8$

Q2. Simplify $\sqrt{500}$

$= \sqrt{100} \times \sqrt{5} = 10\sqrt{5}$

Q3. Solve the equation $4(x - 7) = 3x + 19$

$4x - 28 = 3x + 19$

$+28 \quad +28$

$4x = 3x + 47$

$x = 47$

Q4. Calculate the mean and median of -2, 3, 5, 6, 8, 9

Mean $= \frac{29}{6} = 4.8$ (1dp) Median $= \frac{5+6}{2} = 5.5$

Today we will be marking the check-up, homework and revising over multiplying out and simplifying.

1. $\sqrt{250}$

$\sqrt{25} \times \sqrt{10}$ ✓

$= 5\sqrt{10}$ ✓

2. $2\sqrt{3} + 5\sqrt{3} - \sqrt{3}$

$6\sqrt{3}$ ✓

3. $\sqrt{50} + 3\sqrt{2} - \sqrt{32}$

$\sqrt{25}\sqrt{2} + 3\sqrt{2} - \sqrt{16}\sqrt{2}$ ✓

$5\sqrt{2} + 3\sqrt{2} - 4\sqrt{2}$ ✓

$= 4\sqrt{2}$ ✓

(3)

(3)

4. $\sqrt{3}(\sqrt{8} - \sqrt{2})$

$\sqrt{24} - \sqrt{6}$ ✓

$\sqrt{4}\sqrt{6} - \sqrt{6}$

$2\sqrt{6} - \sqrt{6}$ ✓

$= \sqrt{6}$ ✓

(3)

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

$= \sqrt{3}(\sqrt{2})$

$= \sqrt{6}$

5. $\frac{\sqrt{25}}{\sqrt{4}} = \frac{5}{2}$ ✓

6. $\sqrt{\frac{300}{75}} = \sqrt{4} = 2$ ✓

(3)

7. Write with a rational denominator $\frac{2+\sqrt{3}}{\sqrt{3}}$ $\times\sqrt{3}$ $\times\sqrt{3}$

$\frac{2\sqrt{3}+3}{3}$

(3) 15

DAILY PRACTICE 1.12.2015

Q1. Simplify $15h^7 \div 5h^2$ = $3h^5$

Q2. Calculate the area of a circle with radius 9cm
$A = \pi r^2 = 81\pi = 254.47cm^2$ (to 2d.p.)

Q3. Calculate the volume of a cube with side 4cm
$V = 4\times4\times4 = 64cm^3$

Q4. Multiply out and simplify $4m(3m^{-1} + m^3)$
$12m^0 + 4m^4$
$= 12 + 4m^4$

Q5. Solve the equation $\frac{5m-1}{2} = 17$
$\times2$ $\times2$
$5m - 1 = 34$
$5m = 35$
$m = 7$

Today we will be learning how to multiply out double brackets.

$(2x+1)(x-5)$

Multiplying out and simplifying – Revision

Multiply out and simplify the following:

(a) $3(2x - 1) + 4x$
$= 6x - 3 + 4x$
$= 10x - 3$

(b) $6h(2h - 3) - 4(5h + 8)$
$12h^2 - 18h - 20h - 32$
$12h^2 - 38h - 32$

(c) $2t(t - 5) + 3t(t - 4) + 4t^2$
$2t^2 - 10t + 3t^2 - 12t + 4t^2$
$9t^2 - 22t$

(d) $7h - 8(2h - 4)$
$7h - 16h + 32$
$-9h + 32$

(e) $2Oh + h(2h - 4)$
$2Ih - 2h + 4$
$19h + 4$

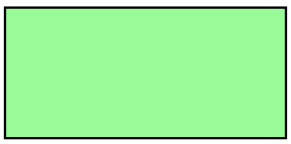
(f) $m^3(m - 2)$
$m^4 - 2m^3$

(g) $3m^3(4m - m^{1/2})$
$12m^4 - 3m^{\frac{7}{2}}$

(h) $\sqrt{2}(2 - \sqrt{8})$
$2\sqrt{2} - \sqrt{16}$
$2\sqrt{2} - 4$

Multiplying out double brackets Questions in Context

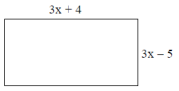
Write an expression for the area of this rectangle

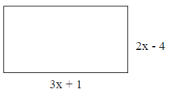


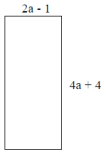
(3 + 6p)

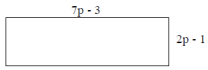
(1 – 4x)

Write an expression for the area of each of these rectangles

1. 

2. 

3. 

4. 

Multiplying out double brackets 1.12.15

Write an expression for the area of the large rectangle

①

	a	b
d	ad	bd
c	ac	bc

$(a+b)(c+d) = ad+ac+bd+bc$

②

	x	2
x	x^2	2x
3	3x	6

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

x^2+5x+6

③

	2x	−1
x	$2x^2$	−x
4	8x	−4

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

$2x^2+8x-1x-4$

$2x^2+7x-4$

Questions

	x	4
x		
1		

① $(x+4)(x+1)$ x^2+5x+4

② $(2x+3)(x-1)$ $2x^2+x-3$

③ $(5x+1)(x+3)$ $5x^2+16x+3$

④ $(2x+2)(x+5)$ $2x^2+12x+10$

⑤ $(3x-4)(4x+5) = 12x^2-x-20$

⑥ $(x^2+8)(x^3-3) = x^5-3x^2+8x^3-24$

Daily Practice 2.12.2015

Q1. Find the value of a car that was worth £15 000 and depreciated by 12% $100\% - 12\% = 88\% = 0.88$

$15000 \times 0.88 = £13\,200$

Q2. Without a calculator, work out the value of $7 \times 8 \times 10^3$ and write your answer in scientific notation

$56 \times 1000 = 56000 = 5.6 \times 10^4$

Q3. Calculate the area of 1 sixth of a circle with a diameter of 20cm

$A = \pi r^2 = \pi \times 10^2 = 314.159...$ $\frac{1}{6}A = \frac{314.159...}{6} = 52.36cm^2$ (2d.p)

Q4. Multiply out and simplify $(2m^2 + 3)(m^5 - 8)$

$2m^7 - 16m^2 + 3m^5 - 24$

Today we will be continuing to multiply out bracket and learn how to square brackets.

Multiplying out double brackets: Quick Method

To multiply out double brackets, multiply each term in the first bracket by each term in the second bracket. (Be careful with signs!)

$(a + b)(c + d)$

$a(c + d) + b(c + d)$

Examples:

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

(b) $(2k + 3)(k + 1)$ $2k^2 + 2k + 3k + 3$ $2k^2 + 5k + 3$

(c) $(5g + 7)(g - 4)$ $5g^2 - 20g + 7g - 28$ $5g^2 - 13g - 28$

Multiplying out double brackets

Questions: Multiply out and simplify

(i) $(2c + 2)(c - 4)$

(ii) $(3h + 5)(h - 7)$

(iii) $(5k - 5)(k + 4)$

(iv) $(2k^2 + 7)(9k - 9)$

(v) $(m^5 + m^3)(m^2 + m)$

(vi) $(7m^8 - 2m)(9m^6 - m)$

(vii) $(2h^5 - 10)(6 - h)$

(viii) $(1 - x)(x - 1)$

(ix) $(\sqrt{3} - 4)(2\sqrt{3} + 5)$

(x) $(5\sqrt{2} + \sqrt{3})(3\sqrt{2} + 4)$

Multiplying out double brackets

Questions: Multiply out and simplify

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

(ii) $(3h + 5)(h - 7)$ $3h^2 - 16h - 35$

(iii) $(5k - 5)(k + 4)$ $5k^2 + 15k - 20$

(iv) $(2k^2 + 7)(9k - 9)$ $18k^3 - 18k^2 + 63k - 63$

(v) $(m^5 + m^3)(m^2 + m)$ $m^7 + m^6 + m^5 + m^4$

(vi) $(7m^8 - 2m)(9m^6 - m)$ $63m^{14} - 7m^9 - 18m^7 + 2m^2$

(vii) $(2h^5 - 10)(6 - h)$ $12h^5 - 2h^6 - 60 + 10h$

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

(ix) $(\sqrt{3} - 4)(2\sqrt{3} + 5)$ $2\sqrt{9} + 5\sqrt{3} - 8\sqrt{3} - 20$ $-3\sqrt{3} - 14$

(x) $(5\sqrt{2} + \sqrt{3})(3\sqrt{2} + 4)$ $15\sqrt{4} + 20\sqrt{2} + 3\sqrt{6} + 4\sqrt{3}$ $30 + 20\sqrt{2} + 3\sqrt{6} + 4\sqrt{3}$

Multiplying out double brackets (surds)

Multiplying out double brackets with surds follows the same process. (Will use when rationalising the denominator)

Examples:

(i) (ii)

Multiplying out double brackets (Squaring)

Square the following out and see if you notice a pattern

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

$(x - 1)(x - 1)$

Daily Practice 4.12.15

Q1. Find the value of a house that was worth £84 000 and appreciated by 6% in its first year and 8% in its second.

$84000 \times 1.06 = £89\,040$

$89040 \times 1.08 = £96\,163.20$

Q2. Multiply out and simplify $(3x - 1)(x + 4)$

$3x^2 + 12x - x - 4$

$3x^2 + 11x - 4$

Q3. Simplify $2\sqrt{3} - \sqrt{48}$

$2\sqrt{3} - \sqrt{16}\sqrt{3}$

$2\sqrt{3} - 4\sqrt{3} = -2\sqrt{3}$

Q4. Simplify $\frac{2m^2 \times 7m^3}{7m^{-5}}$

$= \frac{14m^5}{7m^{-5}} = 2m^{10}$

Q5. Multiply out and simplify $(3x - 2)^2$

$(3x - 2)(3x - 2)$

$9x^2 - 6x - 6x + 4$

$9x^2 - 12x + 4$

Today we will be learning how to square out brackets.

Multiplying out double brackets (Squaring)

Square the following out and see if you notice a pattern

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

$(x + 3)^2$ $x^2 + 6x + 9$

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

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

Multiplying out double brackets (Squaring)

$(x + 2)(x + 2)$

	x	2
2	$2x$	4
x	x^2	$2x$

$(x + 2)^2$

$(2x + 4)$

	$2x$	4
$2x$	$4x^2$	$8x$
4	$8x$	16

	4	$2x$
4		
$2x$		

Squaring out brackets

Squaring out brackets

- Square the first term.
- Multiply first by second and double.
- Square the second term.

Examples:

1. $(x + 10)^2$ $x^2 + 20x + 100$

2. $(3x - 5)^2$ $9x^2 - 30x + 25$

3. $(4 - x)^2$ $16 - 8x + x^2$

4. $(5x + 2)^2$ $25x^2 + 20x + 4$

Squaring out brackets

Multiply out and simplify the following:

(i) $(2x - 1)^2$ $4x^2 - 4x + 1$

(ii) $(3x - 3)^2$ $9x^2 - 18x + 9$

(iii) $(7x - 6)^2$ $49x^2 - 84x + 36$

(iv) $(-2 + 3x)^2$ $4 - 12x + 9x^2$

(v) $(2x - 1)^2 + 7x$ $4x^2 - 4x + 1 + 7x$ $4x^2 + 3x + 1$

(vi) $(x - 8)^2 + (x + 4)^2$ $x^2 - 16x + 64 + x^2 + 8x + 16$ $2x^2 - 8x + 80$

(vii) $3(x + 6)^2 + 2(x - 4)^2 + 5x^2 + 9$ $3(x^2 + 12x + 36) + 2(x^2 - 8x + 16) + 5x^2 + 9$ $3x^2 + 36x + 108 + 2x^2 - 16x + 32 + 5x^2 + 9$ $10x^2 + 20x + 149$

(viii) $\frac{10(x + 3)^8}{(x + 3)^6}$ $= 10(x + 3)^2$ $= 10(x^2 + 6x + 9)$ $= 10x^2 + 60x + 90$

Multiplying out double brackets with trinomials

	x^2	$2x$	5
x	x^3	$2x^2$	$5x$
3	$3x^2$	$6x$	15

$(x+3)(x^2+2x+5) = x^3+5x^2+11x+15$

	$5x^2$	$-2x$	1
$3x$	$15x^3$	$-6x^2$	$3x$
4	$20x^2$	$-8x$	4

$15x^3+14x^2-5x+4$

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

Daily Practice 7.12.2015

Q1. Calculate the volume of a cylinder with radius 4cm and height 17cm

$V=\pi r^2 h = \pi \times 4^2 \times 17 = 854.5cm^3$

Q2. Multiply out and simplify $(2k+3)(k-8)$

$2k^2-16k+3k-24$

$2k^2-13k-24$

Q3. Factorise $4gh - 20h$

$4h(g-5)$

Q4. Simplify $\sqrt{120}$ $= \sqrt{4}\sqrt{30}$

$2\sqrt{30}$

Q5. Evaluate $32^{\frac{2}{5}}$

$\sqrt[5]{32}^2$

$= 2^2 = 4$

Today we will be continuing to learn how to multiply brackets that have more than 2 terms.

Homework online due 14.12.15

Multiplying out double brackets with trinomials

Multiply each term in the first bracket by every term in the second.

(Be careful with signs!)

Examples: Multiply out and simplify

(i) $(k-1)(2k^2+7k+4)$

$2k^3+7k^2+4k-2k^2-7k-4$

$2k^3+5k^2-3k-4$

(ii) $(3m+7)(m^2-8m+3)$

$3m^3-24m^2+9m+7m^2-56m+21$

$3m^3-17m^2-47m+21$

Multiplying out double brackets with trinomials

(a) $(x+5)(2x^2+4x+9)$ $2x^3+4x^2+9x+10x^2+20x+45$ $2x^3+14x^2+29x+45$

(b) $(x-3)(5x^2+x+6)$

(c) $(x-2)(6x^2-5x+7)$

(d) $(x+7)(3x^2+9x-2)$

(e) $(x-4)(5x^2-x-8)$

(f) $(x+1)(7x^2-2x+11)$

(g) $(2x+1)(3x^2+4x+1)$

(h) $(3x+4)(x^2-11x+2)$

(i) $(5x-2)(2x^2+3x-7)$

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

(l) $(k-1)(3k+5)^2$

(m) $(6k-1)(2k^2+3k-1)-(x+5)$

(n) $(h+1)^2-(h+5)^2$

Multiplying out double brackets with trinomials

(a) $(x+5)(2x^2+4x+9)$ $2x^3+4x^2+9x+10x^2+20x+45$ $2x^3+14x^2+29x+45$

(b) $(x-3)(5x^2+x+6)$ $5x^3+x^2+6x-15x^2-3x-18$ $5x^3-14x^2+3x-18$

(c) $(x-2)(6x^2-5x+7)$ $6x^3-5x^2+7x-12x^2+10x-14$ $6x^3-17x^2+17x-14$

(d) $(x+7)(3x^2+9x-2)$ $3x^3+9x^2-2x+21x+63x-14$ $3x^3+30x^2+61x-14$

(e) $(x-4)(5x^2-x-8)$ $5x^3-x^2-8x-20x^2+4x+32$ $5x^3-21x^2-4x+32$

(f) $(x+1)(7x^2-2x+11)$ $7x^3-2x^2+11x+7x^2-2x+11$ $7x^3+5x^2+9x+11$

(g) $(2x+1)(3x^2+4x+1)$ $6x^3+8x^2+2x+3x^2+4x+1$ $6x^3+11x^2+6x+1$

(h) $(3x+4)(x^2-11x+2)$ $3x^3-33x^2+6x+4x^2-44x+8$ $3x^3-29x^2-38x+8$

(i) $(5x-2)(2x^2+3x-7)$ $10x^3+15x^2-35x-4x^2-6x+14$ $10x^3+11x^2-41x+14$

(j) $(4x-3)(3x^2-5x-4)$ $12x^3-20x^2-16x-9x^2+15x+12$ $12x^3-29x^2-x+12$

(l) $(k-1)(3k+5)^2$ $(k-1)(9k^2+30k+25)$ $9k^3+30k^2+25k-9k^2-30k-25$ $9k^3+21k^2-5k-25$

(m) $(6k-1)(2k^2+3k-1)-(x+5)$ $12k^3+18k^2-6k-2k^2-3k+1-x-5$ $12k^3+16k^2-9k-4-x$

(n) $(h+1)^2-(h+5)^2$ $h^2+2h+1-(h^2+10h+25)$ $h^2+2h+1-h^2-10h-25$ $-8h-24$

Daily Practice 8.12.2015

Q1. Multiply out and simplify $(x-4)^2$ $(x-4)(x-4)$ $x^2-4x-4x+16 = x^2-8x+16$

Q2. Find the value of a house that was worth £140 000 and appreciated by 1.5% per annum for 5 years. $100\% + 1.5\% = 101.5\%$ $140\,000 \times 1.015^5 = £150\,819.76$

Q3. State the median and interquartile range of 2, 4, 7, 11, 9, -2, 1, 15

Interquartile range $= Q_3 - Q_1$ $10 - 1.5 = 8.5$

$-2, 1, 2, 4, 7, 9, 11, 15$ median $= Q_2 = \frac{4+7}{2} = 5.5$ $Q_1 = \frac{1+2}{2} = 1.5$ $Q_3 = \frac{9+11}{2} = 10$

Q4. Simplify $\sqrt{200}$ $= \sqrt{100}\sqrt{2} = 10\sqrt{2}$

Q5. Evaluate $16^{-\frac{3}{4}}$ $\frac{1}{16^{\frac{3}{4}}} = \frac{1}{\sqrt[4]{16^3}} = \frac{1}{2^3} = \frac{1}{8}$

Today we will be working out how to rationalise the denominator for more difficult questions.

Homework Online due 14.12.15

Surds: Rationalising the denominator

Revisiting surds...

What happens when you want to rationalise the denominator when you have a fraction of the form below?

$$\frac{3}{1+\sqrt{2}} \times \frac{1-\sqrt{2}}{1-\sqrt{2}} = \frac{3(1-\sqrt{2})}{(1+\sqrt{2})(1-\sqrt{2})}$$

$$= \frac{3-3\sqrt{2}}{1-\sqrt{2}+\sqrt{2}-2} = \frac{3-3\sqrt{2}}{-1} = -3+3\sqrt{2}$$

Surds: Rationalising the denominator

To rationalise the denominator of a fraction with surds where the fraction is of the form

$$\frac{a}{b \pm \sqrt{t}}$$

Multiply both numerator and denominator by the conjugate of the denominator(the denominator with the middle sign changed).

$$\frac{a}{b+\sqrt{t}} \times \frac{b-\sqrt{t}}{b-\sqrt{t}}$$

Surds: Rationalising the denominator using the conjugate

Examples: Write the following with a rational denominator

1. $\frac{2}{3+\sqrt{5}} \times \frac{3-\sqrt{5}}{3-\sqrt{5}}$

$= \frac{2(3-\sqrt{5})}{(3+\sqrt{5})(3-\sqrt{5})}$

$= \frac{6-2\sqrt{5}}{9-3\sqrt{5}+3\sqrt{5}-5}$

$= \frac{6-2\sqrt{5}}{4} \div 2 = \frac{3-\sqrt{5}}{2}$

2. $\frac{1+\sqrt{3}}{4-\sqrt{2}} \times \frac{(4+\sqrt{2})}{(4+\sqrt{2})}$

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

$= \frac{4+\sqrt{2}+4\sqrt{3}+\sqrt{6}}{16+4\sqrt{2}-4\sqrt{2}-2}$

$= \frac{4+\sqrt{2}+4\sqrt{3}+\sqrt{6}}{14}$

Today we will be continuing to learn how to rationalise the denominator.

Solutions:

(a)	$\sqrt{2}+1$	(b)	$\frac{\sqrt{5}-1}{4}$	(c)	$+12(2+\sqrt{3})$	(d)	$-(1+\sqrt{2})$
(e)	$-\frac{1}{2}(1-\sqrt{3})$	(f)	$\frac{3(\sqrt{5}+1)}{4}$	(g)	$-(\sqrt{2}-2)$	(h)	$-\frac{3}{2}(2+\sqrt{6})$
(i)	$\frac{5(3-\sqrt{2})}{7}$	(j)	$-2(1+\sqrt{3})$	(k)	$\frac{\sqrt{7}+2}{3}$	(l)	$\sqrt{3}+\sqrt{2}$
(m)	$6(\sqrt{3}-\sqrt{2})$	(n)	$\frac{3}{2}(\sqrt{10}+\sqrt{2})$	(o)	$-3(\sqrt{5}-\sqrt{6})$	(p)	$\frac{14(9+\sqrt{2})}{79}$

Daily Practice 9.12.2015

Q1. Multiply out and simplify $(x - 4)(2x^2 + 7x - 8)$

$2x^3+7x^2-8x-8x^2-28x+32$

$2x^3-x^2-36x+32$

Q2. Write with a rational denominator $\frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

Q3. Evaluate $144^{\frac{3}{2}}$

$\sqrt{144}^3 = 1728$

Q4. Simplify $k^{\frac{3}{2}}(k^{\frac{1}{2}} + k^2)$

$k^2 + k^{\frac{7}{2}}$

Q5. $\frac{7x+3}{2} = 12$

$\times 2 \quad \times 2$

$7x+3=24$

$-3 \quad -3$

$7x=21$

$x=3$

Surds: Rationalising the denominator using the conjugate

Rationalise the denominator, in each fraction, using the appropriate conjugate surd.

(a)	$\frac{1}{\sqrt{2}-1}$	(b)	$\frac{1}{\sqrt{5}+1}$	(c)	$\frac{12}{2-\sqrt{3}}$	(d)	$\frac{1}{1-\sqrt{2}}$
(e)	$\frac{1}{1+\sqrt{3}}$	(f)	$\frac{3}{\sqrt{5}-1}$	(g)	$\frac{2}{\sqrt{2}+2}$	(h)	$\frac{3}{2-\sqrt{6}}$
(i)	$\frac{5}{3+\sqrt{2}}$	(j)	$\frac{4}{1+\sqrt{3}}$	(k)	$\frac{1}{\sqrt{7}-2}$	(l)	$\frac{1}{\sqrt{3}-\sqrt{2}}$
(m)	$\frac{6}{\sqrt{3}+\sqrt{2}}$	(n)	$\frac{12}{\sqrt{10}-\sqrt{2}}$	(o)	$\frac{3}{\sqrt{5}+\sqrt{6}}$	(p)	$\frac{14}{9-\sqrt{2}}$

Daily Practice 11.12.2015

Q1. Multiply out and simplify $(x - 2)^2 + 3x$

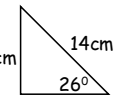
$x^2-4x+4+3x$

x^2-x+4

Q2. Write with a rational denominator $\frac{3}{2+\sqrt{3}} \times \frac{2-\sqrt{3}}{2-\sqrt{3}} = \frac{6-3\sqrt{3}}{(2+\sqrt{3})(2-\sqrt{3})}$

$= \frac{6-3\sqrt{3}}{4-3} = 6-3\sqrt{3}$

Q3. Calculate the height of the triangle



$\sin x = \frac{o}{h}$ $\sin 26° = \frac{h}{14}$

$14\sin 26° = h$

$h = 6.14\text{cm}$ (2dp.)

Q4. Solve $\frac{3x+2}{2} - \frac{x}{2} = 7$

$\times 2 \quad \times 2$

$3x+2-x=14$

$2x+2=14$

$2x=12$

$x=6$

Today we will be learning how to work out some trickier questions on surds and indices.

Homework due Monday.

Mixed Surds & Indices - Tricky Questions 11.12.15

Examples: Simplify the following

(a) $\frac{1}{\sqrt{x}}(x^2 - x^{-\frac{1}{2}})$

(1) $\frac{1}{\sqrt{x}^3} = \frac{1}{x^{\frac{3}{2}}}$

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

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

(4) $3x^{\frac{3}{2}} = 3\sqrt{x^3}$

(5) $\frac{6}{x^{-2}} = 6x^2$

(6) $2x^{-3} = 2 \times \frac{1}{x^3} = \frac{2}{x^3}$

(7) $8x^{-\frac{1}{2}} = 8 \times \frac{1}{x^{\frac{1}{2}}} = \frac{8}{\sqrt{x}}$

(8) $2\sqrt[5]{x}^2 = 2x^{\frac{2}{5}}$

(9) $\frac{3}{\sqrt[4]{x^5}} = \frac{3}{x^{\frac{5}{4}}}$

Daily Practice 14.12.2015

Q1. Multiply out and simplify (2x - 1)(x + 3)

$2x^2+6x-x-3$

$2x^2+5x-3$

Q2. Simplify $p^2(3p - 4)$

$3p^3 - 4p^2$

Q3. Calculate the median and inter-quartile range of 3, 2, 1, 7, 8, 4

1, 2, 3, 4, 7, 7, 8

Median = $Q_2 = 3.5$

$Q_1 = 2$ $Q_3 = 7$

I.Q.R. $= 7 - 2 = 5$

Q4. Write with a positive index $3p^{-4}$

$\frac{3}{p^4}$

Today we will be completing a treasure hunt on indices.

Homework Due.

$\frac{p^7}{p^{-2}}$ p^9

$\frac{2p \times 6p^2}{3p}$ $4p^2$

$(5p^2)^3$ $125p^6$ $\sqrt[3]{p^2}$ $p^{\frac{2}{3}}$

$(2p^2 \times 3p)^2$ $36p^6$ $\sqrt{p^3}$ $p^{\frac{3}{2}}$

$\frac{4p^2 \times 6p}{3p^7}$ $\frac{8}{p^4}$ $\frac{p^{14}}{p^2}$ p^{12}

$p^2(p^{-4} + 2p^3)$ $p^{-2} + 2p^5$ $p^4 \times p^3$ p^7

$\frac{5p^{-1} \times p^3}{2p^{-5}}$ $2.5p^7$ $p^{-\frac{2}{3}}$ $\frac{1}{\sqrt[3]{p^2}}$

$2p^{-3}$ $\frac{2}{p^3}$ $4p^{-2}$ $\frac{4}{p^2}$

$\sqrt{p}(p+2p^{\frac{1}{2}})$ $\quad$ $p^{\frac{3}{2}}+2p$

$\frac{1}{\sqrt{p}}(p+2p^{\frac{1}{2}})$ $\quad$ $p^{\frac{1}{2}}+2$

Mixed Surds & Indices - Tricky Questions

(b) $(\frac{1}{\sqrt{x}}+x)^2$

Mixed Surds & Indices - Tricky Questions

(c) $\frac{(x+5)^2}{x^{\frac{5}{2}}}$

Simplify each of the following by ..... (i) changing root signs to fractional powers;
(ii) moving x's onto the numerators;
(iii) expanding brackets ..... where necessary.

(a) $x^{\frac{1}{2}}(x^4+1)$ **(b)** $x^{-\frac{1}{2}}(x^{\frac{3}{2}}-x^2)$ **(c)** $\frac{1}{x^2}(x^{\frac{1}{2}}+x)$

(d) $\frac{2}{x^{-3}}(x^2+\frac{1}{x})$ **(e)** $\frac{1}{\sqrt{x}}(x^2-\sqrt{x})$ **(f)** $\left(x^2+\frac{1}{x}\right)^2$

(g) $\frac{1}{x}(\sqrt{x}+x)$ **(h)** $\left(x+\frac{1}{\sqrt{x}}\right)^2$ **(i)** $x^{-2}\left(\frac{1}{x}-\sqrt[3]{x}\right)$

(j) $\frac{x^2+3}{x}$ **(k)** $\frac{\sqrt{x}-x}{x^2}$ **(l)** $\frac{(2x+1)^2}{x^{\frac{3}{2}}}$

14. **(a)** $x^{\frac{3}{2}}+x^{\frac{1}{2}}$ **(b)** $x-x^{\frac{1}{2}}$ **(c)** $x^{-\frac{1}{2}}+x^{-1}$

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

(g) $x^{-\frac{1}{3}}+1$ **(h)** $x^2+2x^{\frac{1}{2}}+x^{-1}$ **(i)** $x^{-3}-x^{-\frac{1}{3}}$

(j) $x+3x^{-1}$ **(k)** $x^{-\frac{1}{3}}-x^{-1}$ **(l)** $4x^{\frac{1}{2}}+4x^{-\frac{1}{2}}+x^{-\frac{3}{2}}$

Daily Practice 15.12.2015

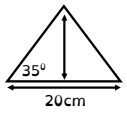
Q1. Solve the equation $\frac{3x+5}{2}-1=x+6$

$3x+5-2=2x+12$
$3x+3=2x+12$
$x+3=12$ $\quad x=9$

Q2. Simplify $2k(k^{-1}+5k^{\frac{1}{2}})^{\frac{1}{2}}$

$2+10k$

Q3. Calculate the height of the triangle



$\tan\theta=\frac{o}{a}$ $\quad \tan 35°=\frac{x}{10}$
$10\times\tan 35°=x$ $\quad x=7\text{cm}$

Q4. Write with a fractional index $\sqrt[4]{x^3}$

$x^{\frac{3}{4}}$

Today we will be practising how to factorise and going through the homework.

Q1. Expand the brackets and simplify the following expressions

(a) $(r - 3)(r + 10)$ (b) $(3w - 2)^2$ (c) $(7a - 2)(a + 5)$

$r^2+10r-3r-30$ ✓ $(3w-2)(3w-2)$ $9w^2-6w-6w+4$ $7a^2+35a-2a-10$ ✓

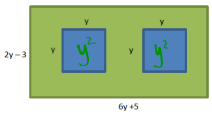
$r^2+7r-30$ $9w^2-12w+4$ $7a^2+33a-10$

(f) $(x+1)(4x^2+6x-1)$ (g) $(2a-3)(3a^2-7a+4)$

$4x^3+6x^2-x+4x^2+6x-1$ $6a^3-14a^2+8a-9a^2+21a-12$

$4x^3+10x^2+5x-1$ ✓ $6a^3-23a^2+29a-12$ ✓

(2)A garden measuring 6y + 5 metres by 2y − 3 metres has two square flower beds of side y metres. The rest is grass.



(a) Write an expression for the total area of the garden.

$(6y+5)(2y-3)$ ✓ $12y^2-18y+10y-15$ $12y^2-8y-15$

(b) Write an expression for the area of the grass.

$(6y+5)(2y-3) - 2y^2$ ✓

(c) If y = 2 and lawn food costs £1.50 per square metre what is the cost of the lawn food needed to feed all of the grass?

$12y^2-8y-15-2y^2$

$10y^2-8y-15$

$10(2)^2-8(2)-15$ ✓ sub. 2 into expression

$40-16-15=9$ Sq. metres ✓ multiply

$£1.50 = £13.50$ ✓ answer

✓ ✗ ✓ ✗ 17

Today we will be learning how to factorise.

Daily Practice 16.12.2015

Q1. Write with a fractional index $\sqrt[3]{x^4}$

$x^{\frac{4}{3}}$

Q2. Find the value of a house that was worth £88 000 and appreciated by 4% per annum for 7 years

$100\% + 4\% = 104\% = 1.04$

$88000 \times 1.04^7 = £115\,802$

Q3. Multiply out and simplify $(2k - 3)(k + 4)$

$2k^2+8k-3k-12$

$2k^2+5k-12$

Q4. Simplify $\sqrt{24}+\sqrt{72}$

$\sqrt{8}\sqrt{3}+\sqrt{8}\sqrt{9}$

$2\sqrt{2}\sqrt{3}+2\sqrt{2}\times 3$

$2\sqrt{6}+6\sqrt{2}$

Multiplying out brackets -Working Backwards

What multiplies out to give these solutions?

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

$12ab+4b$ $b(12a+4)$ $4b(3a+1)$ $2b(6a+2)$ $4(3ab+b)$

x^2+6x+9 $(x+3)(x+3)$ $(x+3)^2$ $x(x+6)+9$

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

b^2+5b+6 $(b+3)(b+2)$ $b(b+5)+6$

$100b^2-25$ $100(b^2-\frac{1}{4})$ $25(4b^2-1)$ $5(20b^2-5)$ $(10b+5)(10b-5)$ $25(2b+1)(2b-1)$

x^2-1 $(x+1)(x-1)$ $2(x^2-3)-2x^2+6-1$

Factorising

The opposite of multiplying out is known as factorising.

There are three types of factorising:

1. Common Factor
2. Difference of 2 squares
3. Factorising trinomials.

look for a

Factorising - Common Factor

Take out the HCF (both numerical and algebraic)

Examples: Factorise

1. $12ah - 18h^2$

$= 6h(2a - 3h)$

2. $30ab - 20b^2 + 10bc$

$= 10b(3a - 2b - c)$

Factorising - Common Factor

Come up with 5 factorising questions in which the person has to take out a common factor.

Daily Practice 18.12.15

15 Questions Mental Maths

Today we will be continuing to learn to factorise.

Factorising - Difference of 2 squares

Multiply out and simplify the following:

1. $(x - 3)(x + 3)$

$x^2 - 9$

2. $(2x + 1)(2x - 1)$

$4x^2 - 1$

3. $(7h + 4)(7h - 4)$

$49h^2 - 16$

4. $25(1 - 2x)(1 + 2x)$

$25 - 100x^2$ → $25(1 + 2x - 2x - 4x^2)$

$25(1 - 4x^2)$

Factorising – Difference of 2 squares

What pattern do you notice?

Factorising – Difference of 2 squares

Working backwards. What do we get when we factorise

$a^2 - b^2$?

$(a + b)(a - b)$

$a^2 - ab + ab - b^2$

$a^2 - b^2$

Factorising – Difference of 2 squares

✳ First, always look for a common factor.

To identify a difference of 2 squares, it will be 2 terms that are squares and there is a minus inbetween. Be familiar with your sqaure numbers.

Examples: Factorise the following

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

(b) $81 - m^2$ $(9 + m)(9 - m)$

(c) $9x^2 - 100y^2$ $(3x + 10y)(3x - 10y)$

(d) $50 - 32m^2$ $2(25 - 16m^2)$ $2(5 + 4m)(5 - 4m)$

(e) Evaluate $1.75^2 - 1.25^2$ $(1.75 + 1.25)(1.75 - 1.25)$ $(3)(0.5)$ $= 1.5$

pg. 154
Q1 2nd Column
Q2 middle column
Q3+4

Daily Practice 8.1.2016

Q1. Multiply out and simplify $(3x - 1)(2x + 4) + 2x$ $6x^2 + 12x - 2x - 4 + 2x$ $6x^2 + 12x - 4$

Q2. Find the value of a car that was worth £4500 and depreciated by 14% per annum for 2 years $100\% - 14\% = 86\%$ $4500 \times 0.86^2 = £3328.20$

Q3. $1\frac{2}{3} - \frac{4}{5} = \frac{5}{3} - \frac{4}{5} = \frac{25}{15} - \frac{12}{15} = \frac{13}{15}$

Q4. Simplify $2m^2(3m^{\frac{1}{2}} + m^{-3})$ $6m^{\frac{5}{2}} + 2m^{-1}$ $= 6m^{\frac{5}{2}} + \frac{2}{m}$

Q5. Write with a rational denominator $\frac{3}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$ $= \frac{3\sqrt{2}}{2}$

Today we will be learning how to factorise trinomials.

Factorising Trinomials 8.1.16

A trinomial is an algebraic expression that is of the form

$ax^2 + bx + c$

When we factorise it, we are thinking, 'what pair of brackets multiplies out and simplifies to get this answer?'

The answer will be a pair of double brackets. Always look for a common factor first! We can use the rectangle to help us.

Remember?

$$(x + 6)(x + 4)$$

	x	6
x	x^2	$6x$
4	$4x$	24

$x^2 + 10x + 24$

Factorising Trinomials with a unitary x^2 coefficient

Examples:

1. Factorise $x^2 + 5x + 6$

	x	2
x	x^2	$2x$
3	$3x$	6

$(x+2)(x+3)$

Factorising Trinomials with a unitary x^2 coefficient

Examples:

2. Factorise $x^2 - 11x + 24$

	x	-8
x	x^2	$-8x$
-3	$-3x$	24

$(x-8)(x-3)$

Factorising Trinomials with a unitary x^2 coefficient

Examples:

3. Factorise $x^2 - 7x - 44$

	x	-11
x	x^2	$-11x$
$+4$	$+4x$	-44

$(x-11)(x+4)$

Factorising Trinomials with a unitary x^2 coefficient

Questions: Factorise the following

1. $x^2 + 12x + 35$
2. $x^2 + 5x + 4$
3. $x^2 - 14x + 40$
4. $x^2 - 6x + 5$
5. $x^2 - 7x - 30$
6. $x^2 - 11x + 28$
7. $x^2 + 15x + 56$
8. $x^2 - 8x - 20$
9. $x^2 - 13x - 48$
10. $x^2 - 9x - 22$
11. $2x^2 + 20x + 42 = 2(x^2 + 10x + 21)$
12. $3x^2 - 24x + 36$
13. $5x^2 - 20x - 25$

Daily Practice 11.1.2016

Q1. Find 19% of 2100

10% ⇒ 210
1% ⇒ 21
9% ⇒ 189

399

Q2. Calculate the height of a cylinder with a radius of 4cm and a volume of 603.19cm³

$V = \pi r^2 h = 603.19$
$\pi \times 16 \times h = 603.19$
$h = \frac{603.19}{16\pi}$
$h = 12\text{cm}$

Q3. $2\frac{1}{3} - \frac{3}{5} = \frac{7}{3} - \frac{3}{5} = \frac{35}{15} - \frac{9}{15} = \frac{26}{15} = \frac{11}{15}$

Q4. Multiply out and simplify $(x - 3)(x + 4)$

$x^2 + 4x - 3x - 12$
$x^2 + x - 12$

Q5. Solve $\frac{3x+9}{4} = 3$

$3x + 9 = 12$
$-9 \quad -9$
$3x = 3$
$x = 1$

Today we will be continuing to learn how to factorise trinomials.

Homework Online due 18.1.16

Factorising Trinomials with a non-unitary x^2 coefficient

Examples:

1. Factorise $10x^2 - x - 3$

	$5x$	-3
$2x$	$10x^2$	$-6x$
1	$5x$	-3

$(5x-3)(2x+1)$

Factorising Trinomials with a non-unitary x^2 coefficient

Examples:

2. Factorise $4p^2 + 3p - 7$

	$4p$	$+7$
p	$4p^2$	$7p$
-1	$-4p$	-7

$(4p+7)(p-1)$

Factorising Trinomials with a non-unitary x^2 coefficient

Examples:

3. Factorise $4x^2 + 21x - 18$

	$4x$	-3
x	$4x^2$	$-3x$
2	$24x$	-18

$(4x-3)(x+6)$

Daily Practice 12.1.2016

Q1. Calculate the median and quartiles of 2, 3, 7, 1, 8, 11, 4

$Q_2 = 4$ (median) $Q_1 = 2$ $Q_3 = 8$ 1 2 3 4 7 8 11

Q2. Calculate the value of a house that cost £320 000 and appreciated by 4.2% per annum for 3 years

$320000 \times 1.042^3 = £362\,037.15$

Q3. Multiply out and simplify $(3x - 1)(2x^2 + 6x - 1)$

$6x^3 + 18x^2 - 3x - 2x^2 - 6x + 1$

$6x^3 + 16x^2 - 9x + 1$

Q4. Factorise $x^2 - 36$

$(x+6)(x-6)$

Q5. $2\frac{1}{3} \div \frac{4}{5} = \frac{7}{3} \div \frac{4}{5} = \frac{7}{3} \times \frac{5}{4}$

$= \frac{35}{12} = 2\frac{11}{12}$

Today we will be continuing to practise factorising trinomials.

(a)	$3x^2 + 7x + 2$	**(b)**	$2a^2 - 5a + 3$	**(c)**	$4p^2 - p - 3$
(d)	$2p^2 + 11p + 9$	**(e)**	$6x^2 - 7x + 2$	**(f)**	$3w^2 + 10w - 8$
(g)	$5q^2 + 9q + 4$	**(h)**	$4m^2 - 9m + 2$	**(i)**	$6b^2 + 7b - 20$
(j)	$3a^2 + 14a + 15$	**(k)**	$3p^2 - 37p + 12$	**(l)**	$4d^2 - 4d - 15$
(m)	$6y^2 + 11y + 3$	**(n)**	$24c^2 - 22c + 3$	**(o)**	$36v^2 + v - 2$
				(r)	$12m^2 - 31m + 7$
				(u)	$9c^2 + 18c + 8$
				(x)	$8b^2 - 2b - 15$

Pegasys

(a)	$(3x + 1)(x + 2)$	**(b)**	$(2a - 3)(a - 1)$	**(c)**	$(4p + 3)(p - 1)$
(d)	$(2p + 9)(p + 1)$	**(e)**	$(3x - 2)(2x - 1)$	**(f)**	$(3w - 2)(w + 4)$
(g)	$(5q + 4)(q + 1)$	**(h)**	$(4m - 1)(m - 2)$	**(i)**	$(2b + 5)(3b - 4)$
(j)	$(3a + 5)(a + 3)$	**(k)**	$(3p - 1)(p - 12)$	**(l)**	$(2d + 3)(2d - 5)$
(m)	$(3y + 1)(2y + 3)$	**(n)**	$(6c - 1)(4c - 3)$	**(o)**	$(4v + 1)(9v - 2)$
				(r)	$(3m - 7)(4m - 1)$
				(u)	$(3c + 4)(3c + 2)$
				(x)	$(4b + 5)(2b - 3)$

Daily Practice 13.1.2016

Q1. Calculate the value of a painting worth £4500 that appreciated by 12.5% in year 1 and depreciated by 4.8% in year 2.

100% + 12.5% = 112.5% = 1.125

4500 × 1.125 = £5062.5

100% - 4.8% = 95.2% = 0.952

5062.5 × 0.952 = £4819.80

Q2. Factorise $5x^2 - 2x - 3$

$(5x + 3)(x - 1)$

Q3. Solve $\frac{5x+3}{3} = x + 5$

$\times 3 \quad \times 3$

$5x + 3 = 3x + 15$

$2x = 12$

$x = 6$

Q4. Write in scientific notation 0.0008976

8.976×10^{-4}

Q5. $2\frac{3}{5} - \frac{4}{7}$

$= \frac{13}{5} - \frac{4}{7} = \frac{91}{35} - \frac{20}{35} = \frac{71}{35} = 2\frac{1}{35}$

Today we will be continuing to practise factorising trinomials.

MIA 3B Page 156

Daily Practice 15.1.2016

Q1. Simplify $\frac{a^3 \times 7a^5}{a^3}$

$= \frac{7a^8}{a^3} = 7a^5$

Q2. Multiply out and simplify $(x - 4)(1 - 3x + 2x^2)$

$x - 3x^2 + 2x^3 - 4 + 12x - 8x^2$

$2x^3 - 11x^2 + 13x - 4$

Q3. Factorise $49 - c^2$

$(7 - c)(7 + c)$

Q4. If two bottles are similar in shape. The height of the smaller bottle is 4cm, the height of the larger bottle is 6cm. Calculate the volume of the larger bottle if the volume of the smaller bottle is 600ml

S.f. $= 6 \div 4 = 1.5$

V.S.f. $= \left(\frac{3}{2}\right)^3$

Volume larger bottle $= 600 \times \left(\frac{3}{2}\right)^3 = 2025\text{ml}$

Today we will be completing mixed questions on factorisation.

Homework due Monday!

Mixed Factorisation

Always look for a common factor first.

Look out for difference of two squares i.e. $a^2 - b^2$

Trinomials will always be of the form $ax^2 + bx + c$

Some may look like a trinomial but you may only be able to get common factor and go no further.

Daily Practice **18.1.16**

20 Questions Mental Maths

Today we will be completing a check-up on multiplying out and factorising.

Q1. Factorise each of the following fully using **common factors** :

(a) $3x + 6$ $3(x+2)$ ✓

(b) $16a - 12b$ $4(4a-3b)$ ✓

(c) $x^2 + 3x$ $x(x+3)$ ✓

(d) $6mn + 8mp - 4mq$ $2m(3n+4p-2q)$ ✓

4

Q2. Factorise each of the following **differences of squares** :

(a) $x^2 - y^2$ $(x+y)(x-y)$ ✓ ✓

(b) $9a^2 - b^2$ $(3a+b)(3a-b)$ ✓ ✓

4

(c) $25p^2 - 4q^2$

$(5p+2q)(5p-2q)$

(d) $1 - 16x^4$

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

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

4

Q3. Factorise each of the following **quadratic expressions** :

(a) $r^2 + 6r + 8$

$(r+4)(r+2)$

(b) $s^2 - 4s + 4$

$(s-2)(s-2)$

or

$(s-2)^2$

4

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

$(w-3)(w+2)$

(d) $m^2 + m - 12$

$(m+4)(m-3)$

4

(e) $2k^2 + 3k + 1$

$(2k+1)(k+1)$

(f) $24x^2 + 2x - 1$

$(6x-1)(4x+1)$

4

(g) $1 - h - 2h^2$

$(1-2h)(1+h)$

or

$(-2h+1)(h+1)$

4

(h) $9a^2 + 6a - 8$

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

Q4. Fully factorise each of these expressions. There is a mixture of types.

(a) $4a^2b - 8ab^2$

$4ab(a-2b)$

$4a(ab-2b^2)$

1

$2ab(2a-4b)$

(b) $6x - 24x^3$

$6x(1-4x^2)$

$= 6x(1+2x)(1-2x)$

5

(c) $4b^2 + 14b - 8$

$2(2b^2 + 7b - 4)$

$2(2b - 1)(b + 4)$

(3)

$(2b+8)(2b-1)$ (2)

$(4b-2)(b+4)$

(2)

(d) $1 - x^4$

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

(2)

TOTAL MARKS ~~37~~ 38