Chapter 1 Number: Using calculators

1.1 Basic calculations and using brackets HOMEWORK 1A

1	а	67	b	85	С	33
2	а	253	b	54	С	240
3	а	53	b	136	С	68
	d	252				
4	а	195	b	300		
5	а	28.08	b	48.18		
6	а	24.5	b	38.3	С	326.9
	d	11.3				
7	14	days				
8	Alfi Da	e 4.668; Becky 5.464; niel is correct.	Ch	loe 6.137; Daniel 3.77;	3	
9	€78 So	5 is approximately £65 \$100 is worth more.	.79.	\$100 is approximately	/ £6	7.11.
10	а	15.26	b	194.88		
11	а	1.7	b	4.8		
12	а	533.05	b	5.221 096		
1.2	2 Us	sing a calculator to	ado	d and subtract fract	tion	IS

HOMEWORK 1B

1	а	17 20	b	$1\frac{1}{9}$	С	$1\frac{9}{20}$
	d	81 200	е	61 80	f	$1\frac{5}{16}$
	g	13 30	h	$\frac{1}{3}$	i	19 96
	j	<u>169</u> 240	k	<u>199</u> 360	Т	$\frac{301}{468}$
2	а	$12\frac{17}{20}$	b	$10\frac{1}{9}$	С	$9\frac{9}{20}$
	d	$12\frac{81}{200}$	е	$10\frac{61}{80}$	f	$12\frac{5}{16}$
	g	$1\frac{13}{30}$	h	$1\frac{1}{3}$	i	$2\tfrac{19}{96}$
	j	$1\frac{169}{240}$	k	$1\frac{199}{360}$	I	$1\frac{301}{468}$
3	1 2					
4	а	$4\frac{1}{4}$ miles	b	$1\frac{1}{4}$ miles		

- 5 Use the fraction facility on the calculator to enter one-quarter, then press the multiplication key, then enter the fraction two-thirds, then press the equals key.
- **6** 24

7 a
$$-\frac{8}{575}$$

b A negative answer means the first number is less than the second number.

- **8 a** $\frac{29}{297}$ **b** $-\frac{29}{432}$
 - **c** The positive answer in **a** means that $\frac{10}{27}$ is greater than $\frac{3}{11}$. The negative answer in **b** means that $\frac{10}{27}$ is less than $\frac{7}{16}$.
- **9** 28.3 cm
- **10** $\frac{1}{6}$ anticlockwise or $\frac{5}{6}$ clockwise

1.3 Using a calculator to multiply and divide fractions HOMEWORK 1C

1	a $\frac{3}{20}$	b	8 27	с	21 40
	d $\frac{7}{200}$	е	9 64	f	27 512
	g $2\frac{1}{25}$	h	$2\frac{1}{7}$	i	$3\frac{3}{8}$
	j $\frac{63}{80}$	k	$1\frac{1}{24}$	I	$\frac{91}{180}$
2	$\frac{1}{4}$ m ²				
3	12				
4	a $\frac{14}{33}$	b	14 33		
5	a $1\frac{2}{7}$	b	$1\frac{2}{7}$	С	$\frac{1}{3}$
	d $\frac{1}{3}$				
6	a 8 ⁹ / ₂₀	b	$9\frac{17}{27}$	С	$20\frac{37}{40}$
	d $11\frac{137}{200}$	е	$27\frac{261}{320}$	f	$2\frac{439}{512}$
	g $2\frac{1}{145}$	h	$1\frac{8}{31}$	i	$2\frac{11}{104}$
	j $6\frac{93}{160}$	k	$7\frac{61}{792}$	I	$6\frac{409}{558}$
7	$11\frac{1}{12}$ m ²				
8	$4\frac{17}{20}$ cm ³				

- 9 27 mph
- 10 9 gallons
- **11** 4 ropes, as 3 ropes would give 99 pieces.

Functional Maths Activity: Using a calculator

- 1 This is the difference between the readings taken in August and November.
- 2 kilowatt-hour, the amount of energy converted if work is done at an average rate of one thousand watts for one hour
- **3** The higher rate is the standard rate. The lower rate is charged for units over a certain number; this is to encourage people to use electricity without incurring very high bills.
- 4 Yes, although the decimal number 2785.529 327 could be rounded to 2785.53.

- 5 187 metric units convert to 2083.57 kWh (rounded down); first 683 kWh @ 6.683p cost £45.64, the remaining 1400.57 kWh cost £46.11, giving a total bill of £91.75.
 - NB. There is a mistake in the book. It should read:

First 683.00 kWh x 6.683p £45.64

Next 2102.52 kWh x 3.292p £69.21

Total cost of gas used £114.85

Chapter 2 Number: Number properties 2

2.1 Rational numbers and reciprocals HOMEWORK 2A

1	i	а	0.75		b 0.0Ġ			с	0.04
	(d	0.09		e 0.05				
2		а	$\frac{4}{-1} = 0.307692$. $\frac{5}{-1}$	= 0.3	384615. <u>-</u>	= 0.461538	, ,	⁷ _=0.	538461. <u>8</u> =0.615384.
	-		$\frac{13}{9} = 0.602207$ $\frac{10}{10}$	0	13 13 13	-0.946152	' 1 , 1	3 2 - 0	022076
	Ŀ		$\frac{13}{13} = 0.092307$, $\frac{13}{13} = 0.092307$	= 0.	709230, <u>13</u>	= 0.640155	', <u>1</u>	<u>3</u> =0.	923076
	D	R6 2	epeating numbers a	re c	syclic and be	long to one	OT T	wo s	ets of numbers.
3	$\frac{1}{5}$,	$\frac{2}{9}$,	$\frac{23}{100}$, $\frac{3}{11}$, $\frac{2}{7}$						
4	а	$\frac{51}{10}$	7 10	b	$\frac{11}{40}$	с	;	17 20	
	d	3	5	е	$3\frac{13}{20}$				
5	а	0	, 25	b	0 125	c	: (0 031	25
•	d	0.	025	e	0.01	·		0.00	
6	а	$\frac{3}{2}$	$=1\frac{1}{2}$	b	$\frac{8}{5} = 1\frac{3}{5}$	с	;	$\frac{10}{2}$ =	$1\frac{1}{6}$
	Ч	12	² – 1 ⁵	•	$20 - 1^{3}$			5	5
_	u	7	1 7	C	$\overline{17}$ – $1\overline{17}$				
7	Re	ecip	rocal of $1 = 1 \div 1 =$	1	-				
8	а	4		b	5				
c The reciprocal of a reciprocal is always the original number.									
						yo the origina	an	lanno	
2.2	2 M	ulti	iplying and divid	ing	by powers	s of 10		iumb	
2.2 HC	2 M ME	ult EW@	iplying and dividi ORK 2B	ing	by powers	s of 10			
2.2 HC 1	2 M DME a	ulti EWG 35	iplying and dividi ORK 2B	ing b	by powers	s of 10 c	; (6740	
2.2 HC 1	2 M DME a d	ult EW(35 46	iplying and divid ORK 2B 50 5.3	ing b e	by powers 21.5 301.45	s of 10 c f	; (6740 78 56	60
2.2 HC 1	2 M ME a d g	ult EW0 35 46 64	iplying and dividi ORK 2B 50 5.3 42	ing b e h	by powers 21.5 301.45 0.67	s of 10 c f i		6740 78 56 85	60
2.2 HC 1	2 M ME a d g j	ult 5W0 35 46 64 79	iplying and divid ORK 2B 50 5.3 42 9 800	ing b e h k	by powers 21.5 301.45 0.67 658	s of 10 c f i		6740 78 56 85 21 53	50 30
2.2 HC 1	2 M ME a d g j m	ult 35 46 64 79 88	iplying and divid ORK 2B 50 5.3 42 9 800 39 000	ing b e h k n	by powers 21.5 301.45 0.67 658 35 214.7	s of 10 c f i o		6740 78 56 85 21 53 37 28	60 80 84.1
2.2 HC 1	2 M a d g j m p	ult 35 46 64 79 88 34	iplying and dividi ORK 2B 50 5.3 42 9 800 39 000 4 280 000	ing b e h k n	by powers 21.5 301.45 0.67 658 35 214.7	s of 10 c f i J o		6740 78 56 85 21 53 37 28	50 30 34.1
2.2 HC 1	2 M DME a d g j m p a	ult 35 46 64 79 88 34 45	iplying and dividi ORK 2B 50 5.3 42 9 800 39 000 4 280 000 5.38	ing b e h k n b	by powers 21.5 301.45 0.67 658 35 214.7 43.5	s of 10 c f i c c		6740 78 56 85 21 53 37 28 76.45	50 30 34.1 59
2.2 HC 1	2 M DME a d g j m p a d	ulti 35 46 64 79 88 34 45 64	iplying and divid ORK 2B 50 5.3 42 9 800 39 000 4 280 000 5.38 4.37	ing b e h k n b e	by powers 21.5 301.45 0.67 658 35 214.7 43.5 42.287	s of 10 c f i l o c f		6740 78 56 85 21 53 37 28 76.45 0.278	50 30 34.1 59 34
2.2 HC 1	2 M DME a d g j m p a d g	ult 35 46 64 79 88 34 45 64 2.	iplying and dividi ORK 2B 50 5.3 42 9 800 39 000 4 280 000 5.38 4.37 465	ing b e h k n b e h	by powers 21.5 301.45 0.67 658 35 214.7 43.5 42.287 7.63	s of 10 c f i c c f i i		6740 78 56 85 21 53 37 28 76.45 0.278 0.076	50 30 34.1 59 34 5
2.2 HC 1	2 M pME d g j m p a d g j	ulti 35 46 64 79 88 34 45 64 2	iplying and divid ORK 2B 50 5.3 42 9 800 39 000 4 280 000 5.38 4.37 465 008 97	ing beh k beh k	by powers 21.5 301.45 0.67 658 35 214.7 43.5 42.287 7.63 0.0865	s of 10 c f i l o c f i l		6740 78 56 85 21 53 37 28 76.45 0.278 0.076 0.015	50 30 34.1 59 34 5
2.2 HC 1	2 M ME a d g j m p a d g j m	ulti 35 46 64 79 88 34 45 64 2. 0. 0.	iplying and dividi ORK 2B 50 5.3 42 9 800 39 000 4 280 000 5.38 4.37 465 008 97 000 000 879 9	ing behkn behkn	by powers 21.5 301.45 0.67 658 35 214.7 43.5 42.287 7.63 0.0865 0.234	s of 10 c f i c f i c f i o c f i o		6740 78 56 85 21 53 37 28 76.45 0.278 0.076 0.015 7.654	50 30 34.1 59 34 5 5
2.2 HC 1	2 M ME a d g j m p a d g j m p	ulti 35 46 64 79 88 34 45 64 2 0. 0. 0.	iplying and dividi ORK 2B 50 5.3 42 9 800 39 000 4 280 000 5.38 4.37 465 008 97 000 000 879 9 000 073 2	ing b e h k n b e h k n	by powers 21.5 301.45 0.67 658 35 214.7 43.5 42.287 7.63 0.0865 0.234	s of 10 c f i l o c f i l o		6740 78 56 85 21 53 37 28 76.45 0.278 0.076 0.015 7.654	50 30 34.1 59 34 5
2.2 HC 1 2	2 M ME a d g j m p a d g j m p a	ulti 35 46 64 79 88 34 45 64 2 0 0 0 0 12	iplying and dividi ORK 2B 50 5.3 42 9 800 39 000 4 280 000 5.38 4.37 465 008 97 000 000 879 9 000 073 2 20 000	ing behkn behkn bb	by powers 21.5 301.45 0.67 658 35 214.7 43.5 42.287 7.63 0.0865 0.234 200 000	s of 10 c f i l o c f c c c		6740 78 56 85 21 53 37 28 76.45 0.076 0.076 0.015 7.654	50 30 34.1 59 34 5 5 4
2.2 HC 1 2	2 M a d g j m p a d g j m p a d	ulti 35 46 64 79 88 34 45 64 2 0 0 12 21	iplying and dividi ORK 2B 50 5.3 42 9 800 39 000 4 280 000 5.38 4.37 465 008 97 000 000 879 9 000 073 2 20 000 1 000	ing behkn behkn be	by powers 21.5 301.45 0.67 658 35 214.7 43.5 42.287 7.63 0.0865 0.234 200 000 900	s of 10 c f i l o c f i c f		6740 78 56 85 21 53 37 28 76.45 0.076 0.076 0.076 7.654 14 00	50 30 34.1 59 34 5 5 4 00
2.2 HC 1 2	2 M M a d g j m p a d g j m p a d g	ulti 35 46 64 79 88 34 45 64 2. 0. 0. 0. 0. 12 21 40	iplying and dividi ORK 2B 50 5.3 42 9 800 39 000 4 280 000 5.38 4.37 465 008 97 000 000 879 9 000 073 2 20 000 1 000 0 000	ing behkn behkn beh	by powers 21.5 301.45 0.67 658 35 214.7 43.5 42.287 7.63 0.0865 0.234 200 000 900 6000	s of 10 c f i l o c f i c f i i		6740 78 56 85 21 53 37 28 76.45 0.076 0.076 0.076 0.015 7.654 14 00 125 0	50 30 34.1 59 34 5 5 4 00 00 00

b 300

e 3

j 30 **4 a** 5

d 40

c 35

f 150

	g	14	h	50	i	6				
	j	15	k	4	I	200				
5	а	730	b	329 000	с	7940				
	d	68 000 000	е	0.0346	f	0.000 507				
	g	0.000 23	h	0.000 89						
6	а	37 800	b	180						
7	20	× 80 000 = 1 600 000		6000 × 300 = 1 800 0	000					
	50	0 × 7000 = 3 500 000		10 000 × 900 = 9 000	00 0	0				
8	10	0 000 km								
2.3	2.3 Prime factors, LCM and HCF									
НС	OME	WORK 2C								
1	а	70 = 2 × 5 × 7	b	$90 = 2 \times 3 \times 3 \times 5$	С	126 = 2 × 3 × 3 × 7				
2	а	36	b	150	С	63				
	d	600	е	675						
3	а	2 ³ × 3	b	$2^2 \times 3^2$	С	3×5^2				
	d	$2^2 \times 3 \times 7$	е	3 ² × 11						
4	а	3 × 3 × 5	b	$3^2 \times 5$						
	С	$90 = 2 \times 3^2 \times 5$, 180 =	= 2 ²	$\times 3^2 \times 5$						
5	а	$51^2 = 3^2 \times 17^2$	b	$51^3 = 3^3 \times 17^3$						
6	Be	cause 7 is the third od	d pi	rime number and is the	eref	ore a factor of 105.				
НС	OME	WORK 2D								
1	а	12	b	24	С	36				
	d	60	е	42	f	120				
2	а	8	b	7	С	6				
	d	12	е	14	f	25				
3	а	i 12	ii	2						
	b	i 24	ii	2						
	С	i 48	ii	4						
	d	i 60	ii	3						
	е	i 300	ii	5						
4	3 p	backs of nuts and 2 pace	cks	of bolts (36 of each)						
5	25	and 30								
2.4	4 Ri	ules for multiplying	an	d dividing powers						
НС	OME	WORK 2E		0						
1	а	7 ⁵	b	7 ⁹	С	74				
	d	710	е	7 ¹²		7				
2	а	x ⁵	b	x ⁹	С	x'				
	d	x ¹⁰	е	x [°]		2				
3	а	4°	b	4 ³	С	4 ²				
	d	4	е	4 [°]		0				
4	а	y°	b	<i>y</i> [°]	С	y				
	d	y ^o	е	<i>y</i> ′						

- **5 a** 1 **b** 6⁰ **c** 1
- 6 The answer is always 1.
- 7 Any two values with a sum of 9, e.g. a = 1 and b = 8.

Problem-solving Activity: The planets

Task 1

- **1** Jupiter (in mass and diameter)
- 2 Pluto
- 3 Pluto
- 4 Jupiter
- 5 Uranus
- 6 Venus and Earth

Task 2

Pluto, Mercury, Mars, Venus, Earth, Uranus, Neptune, Saturn, Jupiter

Task 3

Pluto, Mercury, Mars, Venus, Earth, Neptune, Uranus, Saturn, Jupiter

Task 4

The smallest planets are those closest to the sun and those furthest away, with the larger planets positioned in the middle of the range. Students could use the internet to check this.

Chapter 3 Number: Percentages

3.1 Equivalent percentages, fractions and decimals HOMEWORK 3A

1	а	$\frac{1}{10}$	b	2 5	С	$\frac{1}{4}$
	d	$\frac{3}{20}$	е	<u>3</u> <u>4</u>	f	7 20
	g	3 25	h	7 25	i	14 25
	j	9 50	k	21 50	I	3 50
2	а	0.87	b	0.25	С	0.33
	d	0.05	е	0.01	f	0.72
	g	0.58	h	0.175	i	0.085
	j	0.682	k	1.5	I	1.32

3

Percentage	Fraction	Decimal
10%	$\frac{1}{10}$	0.1
20%	$\frac{2}{10} = \frac{1}{5}$	0.2
30%	$\frac{3}{10}$	0.3
40%	$\frac{4}{10} = \frac{2}{5}$	0.4
50%	$\frac{5}{10} = \frac{1}{2}$	0.5
60%	$\frac{6}{10} = \frac{3}{5}$	0.6
70%	7 10	0.7
80%	$\frac{8}{10} = \frac{4}{5}$	0.8
90%	$\frac{9}{10}$	0.9

- **4** 55%
- **5** 16%
- **6** 23%
- **7** 69%
- **8 a ≈**20%
- **9 a** 75%
- **d** 12%
- **10 a** 23%
- **d** 23.5%
- **11 a** $\frac{17}{20}$
- e 86%b 87%e 180%

b ≈ 75%

b 40%

- **b** 0.85
- c 35%
 f 37.5%
 c 9%
 f 234%
 c 85%

c ≈ 90%

d 43 or more

3.	3.2 Calculating a percentage of a quantity									
Н	OME	EWORK 3B								
1	а	0.23	b	0.7	С	0.04				
	d	1.2								
2	а	38%	b	80%	С	7%				
	d	150%								
3	а	£50	b	£12	С	212 kg				
	d	63 cm	е	£18.48	f	177.5 g				
	g	£0.72	h	304 m	i	£2.52				
	j	£9.80	k	13.6 I	I	£297.60				
4	20	8								
5	Y7	': 240, Y8: 230, Y9: 21	0, Y	′10: 220, Y11: 200; No	, it o	did not reach the target.				
6	37	8 tonnes iron, 63 tonne	es c	hromium, 9 tonnes ca	rbor	ו				
7	а	£7	b	£14.35	С	£42				
8	£6	00								
9	Af	ter a reduction of 10%,	the	prices are 90% of the	ori	ginal; after a further				
	ree	duction of 10%, the prive	ces	are 81% of the origina	I, SC	o this is not a reduction of				
	20	70.								
3.	3 In	creasing or decrea	sin	g quantities by a pe	erce	entage				
н	OME	EWORK 3C								
1	а	£84	b	£165	С	920 m				
	d	400 kg	е	£54.60	f	£39.60				
	g	141.6 cm	h	£46.72	i	1017.5 g				
	j	£123.84								
2	£3	3 800								
3	£5	4.18, £42.14, £8.75; to	otal	charges £109.32; VAT	£8.	.75; total bill £118.07				
4	а	£2160	b	£2320	С	£2480				
5	Ye	es; clock: £21.15, walle	t: £	17.86, towel: £15.04, b	ook	mark: £7.52				
6	£1	5								
Н	OME	EWORK 3D								
1	а	£18	b	£120	С	63 kg				
	d	440 m	е	£247	f	60 cm				
	g	232 g	h	£327.25	i	12 kg				
	j	£39.69								
2	£6	384								
3	21	12								
4	£4	59								
5	No	o, shirt: £24; suit: £104;	sh	oes: £33.60; total £161	1.60	, which is more than he				
e	na	s received for Christma	as.	$\pm 100/ = 6100 \pm 610 =$	- 04	10				
Ö	• Cneaper: for example, $\pm 100 + 10\% = \pm 100 + \pm 10 = \pm 110$.									

$\pounds110 - 10\% = \pounds110 - \pounds11.00 = \pounds99.00$

3.4 Expressing one quantity as a percentage of another quantity HOMEWORK 3E

1	а	20%	b	25%	С	10%
	d	75%	е	80%	f	46%
	g	33.3%	h	30%	i	67.5%
	j	23.8%				
2	а	75%	b	37.5%		
3	а	60%	b	40%		
4	29.	3%				
5	Ye	s, in each case.	а	66.7% profit	b	50.0% profit
	С	50.0% profit	d	66.6% profit		
6	Ра	ul 33.3%, Val 39.2%. ไ	Vall	has the greater perce	ntag	e increase.

HOMEWORK 4F

1	Fra	action	Decimal	Perc	entage			
	$\frac{1}{4}$		0.25	25%				
	4 10		0.4	40%				
	$\frac{3}{20}$		0.15	15%				
2	а	£6.30		b	36 kg		С	84 ml
3	а	72%		b	68%		С	30%
4	а	225		b	3906			
5	а	25%		b	20%		С	£10.50
6	а	£640						
	b	Softwa	re: £102; tot	al: £74	42; amour	nt saved: £900	0; y	es, she can afford it.
7	а	5 kg		b	i			

Functional Maths Activity: The cost of going to work

Task 1

- **1** 48 weeks **2** £1500 **3** £217.35
- **4** Because she takes two weeks of her holiday.
- 5 The answer depends on when she takes the remaining two weeks leave, and whether the monthly ticket covers a calendar month or four weeks exactly/ Likely answer is $11 \times \pounds 217.35 + 2 \times \frac{2}{3} \times \pounds 6.40 = \pounds 2466.05$.
- **6** £10 if she chooses small sandwiches (£13.20 for large).
- 7 20% or $\frac{1}{5}$
- **8** £3.20
- **9** 25 : 32
- **10** £12 000

Task 2

Look for an answer close to ± 554.50 , depending on variations in students' answers. **Task 3**

360 hours **Task 4** £9529.80 before tax. Discuss what rate of tax he would pay, and adjust the figure. **Task 5** Answers will vary.

Chapter 4 Algebra: Basic algebra

4.1	4.1 The language of algebra								
но	ME	WORK 4A							
1	8p								
2	а	<i>x</i> + 4	b	<i>x</i> – 7	С	3 + <i>k</i>			
	d	8 – <i>t</i>	е	<i>x</i> + <i>y</i>	f	4 <i>x</i>			
	g	5 <i>t</i>	h	ab	i	$\frac{m}{2}$			
	j	$\frac{p}{q}$							
3	а	<i>x</i> + 4	b	<i>x</i> – 5					
4	а	3 <i>n</i>	b	<i>n</i> + 2	С	2 <i>n</i> + 5			
5	а	Number in 14, numbe	er ou	ut 23, 107	b	Add 7			
	С	<i>y</i> + 7							
6	16	years							
7	Fra	ank p + 2, Chloe p – 3,	Lizz	zie 2 <i>p</i>					
8	а	£4	b	$\pounds(10 - a)$	С	$\pounds(b-c)$			
9	а	21	b	7 <i>z</i>					
10	а	£10	b	$\pounds \frac{r}{4}$	С	$\pounds \frac{p}{q}$			
4.2	2 Si	mplifying expression	ons						
но	ME	WORK 4B							
1	а	12 <i>t</i>	b	10 <i>y</i>	С	8 y			
	d	9 <i>w</i>	е	$4t^{2}$	f	$6b^{2}$			
	g	$3w^2$	h	$12y^2$	i	$5p^2$			
	j	128 <i>t</i> ²	k	20 <i>m</i> ²	L	$24t^{2}$			
	m	7 <i>mt</i>	n	5 <i>yw</i>	ο	8 <i>tq</i>			
	р	69 <i>nt</i>	q	30 <i>q</i>	r	10 <i>f</i>			
	s	18 <i>k</i>	t	35 <i>r</i>					
2	а	t^3	b	p^3	С	$5m^3$			
	d	$3t^3$	е	8 <i>n</i> ³	f	$20r^{3}$			
	g	t^4	h	k^5	i	16 <i>n</i> ⁵			
	j	$12t^{7}$	k	14 <i>a</i> ⁷	L	$3k^7$			
	m	k^3	n	$10y^{2}$	ο	18 <i>d</i> ³			
	р	-12 <i>p</i> ⁶	q	$5mq^2$	r	$12m^2y$			
	S	$12m^{2}t$	t	$10q^2p^2$					
3	32								
4	а	D	b	$12m^2$					
5	12	r ²							
HO	ME	WORK 4C							
1	а	3 <i>a</i>	b	5 <i>b</i>	С	9 <i>c</i>			
	d	4 <i>d</i>	е	3 <i>e</i>	f	8 <i>f</i>			

	g	0	h	 2 <i>h</i>	i	$5i^2$
	j	$4j^{2}$				
2	а	8x + 3y	b	2 <i>m</i> + 10 <i>p</i>	С	6 <i>x</i> + 4
	d	5 + 3x	е	8 <i>p</i>	f	6 <i>x</i> – 2
	g	2 <i>p</i> – 6	h	6x - 2y	i	7 + 6p - 3t
	j	6w - 4k				
3	а	<i>x</i> + 9	b	3 + 2 <i>y</i>	с	4 <i>a</i> - 2 <i>b</i>
	d	2 <i>c</i> - 4 <i>d</i>	е	7x + 8y - 3	f	2 <i>b</i>
4	а	$x^2 + 5$	b	a ² + 5b	с	$5k^2 - 2k$
	d	d	е	$2x^2 + 4y^2$	f	$-2y^2 - z^2$
5	6.6	6 m				
6	а	w - x	b	w + y		
7	а	(3x - 1) - 2x	b	12 <i>x</i>	С	48 cm
	? E.	randing brooksto				
4.	S ⊑7					
HC	OME					
1	y +	$y = 2y, y \times y = y^2, 2(y - y^2)$	+ 1)	= 2y + 2		
2	a	12 + 3 <i>m</i>	b	18 + 6 <i>p</i>	C	16 – 4 <i>y</i>
	d	18 + 21 <i>k</i>	е	12 – 20 <i>f</i>	f	8 – 46w
	g	7g + 7h	h	8k + 16m	i	12d - 6n
	j	$t^2 + 5t$	k	$m^2 + 4m$	I	$k^2 - 2k$
	m	$4g^2 + g$	n	$3y^2 - 21y$	0	$7p - 8p^2$
	р	$2m^2 + 10m$	q	$3t^2 - 6t$	r	$15k - 3k^2$
	S	$8g^2 + 6g$	t	$8h^2 - 12h$		
3	а	–4 °C	b	F = 2(C + 15)		
4	Co	rrect answers such as	2(6	5x + 12y), $12(x + 2y)$, $6($	2x -	$+ 4y)_{2}$
5	а	$12t - 10t^2$	b	$12d^2 + 20de$	С	$12y^2 + 15ky$
	d	$18m^{3} - 6m^{2}p$	е	$y^{3} + 7y$	f	$h^4 + 9h$
	g	$k^3 - 4k$	h	$3t^{3} + 9t$	i	$5h^4 - 10h$
	j	$4g^4 - 12g$	k	$10m^3 + 5m^2$	I	$8d^{\circ} - 2d^{\circ}$
	m	$12w^{3} + 4wt$	n	$15a^{3} - 3ab$	0	14 <i>p</i> ⁴ – 16 <i>mp</i>
	р	$3m^2 + 5m^3$	q	$t^4 + 3t^5$	r	$4g^{2}t - 3g^{4}$
	S	$14t^3 + 2mt^2$	t	$12h^{3} + 15gh^{2}$		
HC	ОМЕ	WORK 4E	_	_		_
1	a	9 <i>t</i>	b	7 <i>m</i>	C	7_y
	d	10 <i>d</i>	e	2e	t	3g
	g	2p	h	4t	1	5ť
_	j	$3y^2$	k	7ab	I	a^2d
2	а	18 + 7 <i>t</i>	b	22 + 24 <i>k</i>	С	13 + 32 <i>m</i>
-	d	17 + 13y	е	28 + 12 <i>f</i>	f	20 + 33g
3	a	-9 - 7h	b	4 <i>g</i> – 7	C	-3y + 1
_	d	-t + 1	е	4 <i>k</i> + 9	f	<i>-e</i> + 6
4	a	5m + 2p + 2mp	b	4k + 5h + 3hk	С	t + 3n + 7nt
	d	p + 5q + 8pq	е	6 <i>h</i> + 12 <i>j</i> + 11 <i>hj</i>	f	15y + 2t + 20ty

5 a 80*x* + 270*y* **b** £1400

6	He has worked out 2×3 as 5 instead of 6 and he has worked out $-2 + 15$ as -13 ,
	not +13. Answer should be $16x + 13$.

7 a 5(x + 0.75) + 3(x + 0.25)

b £44.50

4.4 Factorisation

HOMEWORK 4F

1	а	3(3m + 4t)	b	3(3t + 2p)	С	4(m + 3k)
	d	2(2r + 3t)	е	4(w - 2t)	f	2(5p - 3k)
	g	2(6h - 5k)	h	m(2n + 3)	i	g(4g + 3)
	j	2m(2p + k)	k	2b(2c + 3k)	L	4a(2b + c)
2	а	y(3y + 4)	b	t(5t - 3)	С	d(3d - 2)
	d	3m(2m-p)	е	3p(p+3t)	f	4p(2t + 3m)
	g	2b(4a - 3c)	h	4a(a-2b)	i	2t(4m-3p)
	j	4at(5t + 3)	k	2 <i>bc</i> (2 <i>b</i> – 5)	L	2b(2ac + 3ed)
	m	$2(3a^2 + 2a + 5)$	n	3b(4a + 2c + 3d)	ο	t(6t + 3 + a)
	р	3mt(32t - 1 + 23m)	q	2ab(3b + 1 - 2a)	r	5pt(t + 3 + p)
3	а	Does not factorise	b	m(3 + 2p)	С	t(t-5)
	d	Does not factorise	е	2m(4m - 3p)	f	Does not factorise
	g	a(3a - 7b)	h	Does not factorise	i	b(7a-4bc)
	j	Does not factorise	k	3mt(2m + 3t)	I	Does not factorise
4	а	Tess as 9 99 - 1 99 :	= 8 =	so she will just have to	woi	rk out 8 x 8

4 a Tess as 9.99 – 1.99 = 8 so she will just have to work out 8 × 8.
 b Tom £48, Tess £64

5 a	i	<i>x</i> – 4	ii $3(x-4)$	iii $x(x-4)$
-----	---	--------------	-------------	--------------

- **b** x 4 as a factor
- **6 a** The numbers inside each pair of brackets add up to 101 and there are 50 sets of brackets.
 - **b** 5050

4.5 Substitution

HOMEWORK 4G

1	а	7	b	13	С	23
2	а	2	b	14	С	32
3	а	8	b	24	С	$4\frac{1}{2}$
4	а	4	b	0	С	-2
5	а	35	b	60	С	85
6	а	10	b	28	С	1
7	а	12 cm	b	162 m by 27 m by 16.	2 m	1
8	а	2	b	3	С	5
9	а	1	b	4	С	$5\frac{1}{2}$
10	а	10	b	2	С	1
11	а	21	b	33	С	45
12	а	20°C	b	$\frac{5}{9}(-40-32) = \frac{5}{9}(-72)$) = 5	$5 \times -8 = -40$

Functional Maths Activity: Packaging

Discuss the task with students and lead them to identify the third arrangement. They can do this by drawing or by describing the size of the cuboid.

This is a 1 by 2 by 4 cuboid.

Now work out the amount of string for any of the arrangements; for example, the cuboid.

Make sure students are clear about the shape for which shape they are working out the amount of string.

For the cuboid:

 $S = 2 \times 30 + 2 \times 30 + 4 \times 30 + 20 = 260$ cm.

They should now do the same for the two other shapes.

For the 1 by 1 by 8:

 $S = 2 \times 120 + 2 \times 15 + 4 \times 15 + 20 = 350$ cm.

For the 1 by 2 by 4:

 $S = 2 \times 60 + 2 \times 30 + 4 \times 15 + 20 = 260$ cm.

Then they should write down a conclusion, referring to the calculated values.

Masood should pack either as a cube or a 1 by 2 by 4 package, as these both use the same amount (260 cm) of string.



Chapter 5 Statistics: Averages

5.´	1 Tł	ne mode							
нс	OME	WORK 5A							
1	а	2	b	15			С	101	
	d	1	е	$6\frac{1}{2}$					
2	а	E I	b	C4			с	←	
	d	* (е	€					
3	а	40	b	3			С	112	
4	3								
5	а	31							
	b	i dog i	ii	rabbit			iii	dog	
	С	Both students like rabb	oits						
6	Th	ere are equal numbers	of	each m	ake, so th	ney are	e a	ll the mo	ode.
7	а	30	b	21–25	marks				
	С	The 5 students in the 2 than 30 marks.	26-	-30 inte	erval migh	t all ha	ave	scored	fewer
8	а	Time in minutes		0–3	4–7	8–11		12–15	
		Frequency	1	9	13	6		2	
	b								
		13- 12- 11- 10- 8- 8- 7- 6- 4- 3- 2- 1- 0-3 4-7 Time (mi	8- inute	-11 1:	2-15			0	
5 4	с оти	o o	a	4-7 11	inutes		е	Open	more checkouls.
0.4	2 \\#=								
HC 4			h	21			~	0	
1	a d	10	u o	34 1 6			C	0	
2	a	71 kg	e h	62 kg					
4	a C	Median: it is a central v	val	ue ve					
3	a	2	b	3					
•	c	No. all scores have ab	<u></u>	t the sa	me freau	encv.			
4	a	27	b	35			с	22	
	-						-		

- **d** 28
- **e** Could be either with the right reason: girls because the mode is higher, or boys because the median is higher.
- **5 a** Three higher or equal to 11 and 1 less or equal to 11. There are many possible correct answers, e.g. 10, 14, 20 and 20.
 - **b** 4 higher than or equal to 11 and 2 lower than or equal to 11.
 - c 8 numbers, all 3 or under.
- 6 The median of 10 g does not take into account the large weight of 4 kg.
- **7 a** e.g. 7, 8, 9, 10, 15, 20, 20
 - **b** e.g. 7, 8, 9, 10, 10, 20, 20, 20
- **8** 2 | 7
 - 3 | 5, 8
 - 4 | 0, 3, 5, 8, 9
 - 5 | 2, 5, 7, 9
 - 6 | 2, 7, 8
 - 7 | 2, 7, 8
 - 8 | 0, 1, 7 **Key:** 2 | 7 means 27

The median is 57 marks.

- **9 a** 72 **b** 101
 - c Pulse rate increases after exercise.

5.3 The mean

HOMEWORK 5C

- **c** 333 **1** a 4 **b** 24 **d** 3.3 **e** 2 **2** a 22.1 **b** 98.9 **c** 9.8 **d** 181.6 **e** 0.8 **3** 3 hours 18 minutes **4** a £800 **b** £910 **c** i 5 ii 2
 - **d** Median, as it does not take into account the extreme values.
- 5 4 goals
- **6 a** Tango: 6.8, Salsa: 6.2, Ballroom: 6.4, so Kath is right.
 - **b** David and Hannah **c** 1: Azan and Phyllis
- 7 There are many correct answers, e.g. Key family: Brian, Ann, Steve and Albert vs. Charlton family: Hannah, Pete, Chris and George.
- 8 a 62 b 63 c Fay d 2
- **9 a** 31 **b** 47



- **c** Median; 53 kg is an extreme weight.
 - **a** 59 **b** 54
 - c Median, the higher average.
- © HarperCollinsPublishers 2010

5

- **6 a** e.g. 1, 1, 4 **b** e.g. 1.5, 3, 4.5
- 7 The teacher might be quoting the mean, while the student is quoting the mode.

5.6 Frequency tables

HOMEWORK 5F

- **1 a** mode = 16, median = 15, mean = 15.3
 - **b** mode = 5, median = 5, mean = 4.67
- **2** a 289 b 2
- d 1.7 3 a 256 b 3.53 c 72
 - **d** 158
- 4 Eggs: 3 and 4. Frequency: 6 and 4
- **5** Find the total of all the frequencies (52), divide by 2 (26) and identify the median number of days (3).

5.7 Grouped data

HOMEWORK 5G

- **1 a i** 61–80 **ii** 58
- **b** i 20.01–30.00 ii £27.40
- **2 a** 79
- 35 minutes

c mode

c 142

3 The first 5 and the 10 are the wrong way round.

b

4 Find the mid-point of each group, multiply that by the frequency and add those products. Divide that total by the total frequency.

5.8 Frequency polygons

HOMEWORK 5H

1 a



b 1.4 goals



- **b** 5.3 minutes
- **c** The majority of customers (over 70%) wait longer than 5 minutes, open more checkouts.
- 4 2.49 hours
- **5** 30 seconds is exactly in the middle of the zero to one minute group. These people are in that band, but it could be that no one actually waited for exactly 30 seconds.

Functional Maths Activity: Words and books

Discuss students' answers with them and ask them to explain their reasoning.

Chapter 6 Geometry: Perimeter and area

6 .′	1 Pe	erimeter									
НС	HOMEWORK 6A										
1	а	20 cm	b	18 cm	С	36 cm					
	d	18 cm	е	32 cm	f	36 cm					
2	Exa	amples of rectangles v	vith	perimeters of 14 cm (1	× (6, 2 × 5, 3 × 4)					
3	Ye	s, use fractions of a cr	n, e	.g. a rectangle 2 cm by	/ 2.5	5 cm.					
4	C:	the other two both hav	ve a	perimeter of 16 cm.							
5	16	m									
~		· · · · · · · · · · · · · · · · · · ·									
6.7	2 Ar	ea of an irregular s	na	0e							
НС	OME	WORK 6B									
1	а	6 cm ²	b	13 cm ²	С	$4\frac{1}{2}$ cm ²					
	d	5 cm ²									
2	а	9–11 cm ²	b	11–13 cm ²	С	13–15 cm ²					
	d	12–14 cm ²									
3	15-	–18 km²									
4	а	7 cm ²	b	4 by 4 square							
5	Out	er area = 36 cm²; inne	er ar	ea 16 cm²: (36 + 16) ÷	2 =	26 cm ²					
6.3	3 Ar	ea of a rectangle									
нс	OME	WORK 6C									
1	а	10 cm ² , 14 cm	b	16 cm ² , 16 cm	С	16 m², 20 m					
	d	36 mm ² , 30 mm	е	200 m ² , 60 m		·					
2	а	12 cm, 8 cm ²	b	22 cm, 28 cm ²	с	5 cm, 30 cm ²					
	d	5 cm, 16 cm	е	10 cm, 5 cm or 5 cm,	10	cm					
3	36	cm ²									
4	а	i 100	ii	300	iii	1200					
	b	i 10 000	ii	40 000	iii	100 000					
5	48	cm ²									
6	37	5									
6.	1 Δr	ea of a compound	sha	Ine							
			3110	ipe							
1			h	40 cm^2	~	60 cm^2					
1	d A	60 cm^2	U O	500 cm^2	U						
2	u	2.5 m^2	e								
2	d h	Z.U III Voc. the area in one i		$c 2.5 m^2$							
	b Yes, the area in one roll is 2.5 m ²										

3 Then bottom length of the shape should be given as 10. This would mean she is incorrect and the area is 52 cm^2 .

4 6 cm and 4 cm

6	5 Area of a triangle									
0.3										
HC			o. o. ²		70 040 2					
1	a 12 cm, 6 cm ²	b	24 cm, 24 cm ²	С	$70 \text{ cm}, 210 \text{ cm}^2$					
2	a 40 cm ²	b	168 m ⁻	С	32 m ²					
3	162 cm ²									
4	c: 24 cm ²									
5	Jen, as she used the corr	rect	height; Jack used the	slai	nting side.					
6	120 cm ²									
HC	DMEWORK 6F		2		222 2					
1	a 20 cm ²	b	35 cm ²	С	308 cm ²					
_	d 7.5 m ²	е	54 cm ²	f	100 cm ²					
2	a 24 cm ²	b	35 cm²	С	12.5 cm ²					
	d 6 cm	е	5 cm		2					
3	a 1800 cm ²	b	144 cm ²	С	116 cm ²					
4	Students should have dra	awn	two triangles with the	pro	duct of base and height					
F	80 Cm .									
5										
6	Areas are the same but the	ne p	perimeters are differen	τ.						
1	40									
6.0	6 Area of a parallelogra	m								
нс	DMEWORK 6G									
1	a 15 cm^2	b	40 cm^2	С	16 m ²					
•	d 240 cm ²			•						
2	256 cm^2									
3	b and c: $\frac{1}{2} \times 12 \times 6 = 36$	cm²	2 and 9 × 4 = 36 cm ²							
	0.1 and 0.1	0111								
4	24 cm									
6.	7 Area of a trapezium									
но	MEWORK 6H									
1	a 23.1 cm. 28 cm ²	b	36 cm. 66.5 cm ²							
2	a 89 m ²	b	35.5 cm^2							
3	a 45 cm^2	b	24 cm^2							
4	a is larger (a is 10 cm ² ar	nd b	$0 \text{ is } 9.6 \text{ cm}^2$							
5	Incorrect multiplication of	ter	ms inside brackets (sh	e sł	hould have multiplied both					
-	terms by $\frac{1}{2}$) and units are	e inc	correct; correct answei	r is 6	65 cm^2 .					

```
6 68.75 m<sup>2</sup>
```

7 *a* + *b* = 8 with *a* < *b*

Problem-solving activity: Pick's theorem

Pick's theorem provides a simple formula for calculating the area, *A*, of a polygon constructed on a grid of equally spaced points, so that each vertex is located on one of the grid points. This would be like every vertex falling on the grid lines of a coordinate graph so that they all have integer coordinates.

If the number of points that fall inside the polygon is taken as *i* and the number of points that are located exactly on the perimeter of the polygon is *b*, then the area is given by:

$$A=i+\frac{b}{2}-1$$

Chapter 7	Number:	Ratios. s	peed and	proportion
enapter i			pood and	proportion

7.1	l Ra	atio				
нс	ME	WORK 7A				
1	а	1:3	b	1:5	С	1:6
	d	1:3	е	2:3	f	3 : 5
	g	5:8	h	15 : 2	i	2:5
	j	5:2				
2	а	1:4	b	3:4	С	1:8
	d	2:5	е	2:5	f	8 : 15
	g	10 : 3	h	1:3	i	3:8
	j	1:5				
3	а	$\frac{1}{4}$	b	$\frac{3}{4}$		
4	а	2 5	b	3 5		
5	а	$\frac{1}{10}$	b	9 10	с	100 tonnes
6	2 :	1				
7	$\frac{1}{16}$					
нс	ME	WORK 7B				
1	а	£2 : £8	b	£4 : £8	С	£10 : £30
	d	10 g : 50 g	е	1 h : 9 h		
2	а	300	b	100		
3	2 n	n and 18 m				
4	а	10 kg : 15 kg	b	18 days : 12 days	С	30 m : 40 m
	d	£1.50 : £3.50	е	15 h : 9 h		
5	400	C				
6	45					
7	£6					
8	Ga	s bill: £30; electricity b	ill: £	36; she will need to pa	ay £	3 on the electricity bill.
9	а	1:1.5	b	1:2.5	С	1 : 1.25
	d	1 : 1.6	е	1:2.1		
10	$\frac{1}{30}$					
HC	ME	WORK 7C				
1	20					
2	80					
3	а	15 litres	b	25 litres		
4	а	80 kg	b	5 kg		
5	90					
6	а	200 g	b	320 g		
7	a	£4000	b	£6000		
8	Fre	ed's, at 4 : 1; Jodie's is	onl	y 3 . 5 : 1.		

7.	2 S	pee	d, time and dist	anc	e				
н	OME	EWO	RK 7D						
1	15 mph								
2	180 miles								
3	46	mpl	n						
4	2р	m							
5	а	30	mph	b	50 km/h	С	20 miles		
	d	50	km	е	$3\frac{1}{4}$ hours	f	3 hours 36 minutes		
6	а	130) km	b	52 km/h				
7	а	30	minutes	b	12 mph				
8	а	1.2	5 h	b	45 miles				
9	24	mpl	n						
7.	3 D	irec	t proportion pro	ble	ems				
н	OME	EWO	RK 7E						
1	£8								
2	£2	.16							
3	£4	9.60)						
4	а	€2.	25	b	20				
5	а	£27	7.20	b	11				
6	а	6 li	tres	b	405 miles				
7	48	sec	onds						
8	а	i	50 g margarine, 2	2 tb	sp golden syrup, 40 g	sug	ar, 100 g oats		
		ii	200 g margarine,	8 t	bsp golden syrup, 160	g s	ugar, 400 g oats		
	_	iii	250 g margarine,	, 10	tbsp golden syrup, 20	0 g	sugar, 500 g oats		
-	b	60							
9	6								
7.	4 B	est	buys						
Н	OME	EWO	RK 7F						
1	а	£2.	50 for a twin-pack	b	£2.20 for 1	С	95p for 10		
	d	£2.	75 for 750 grams						
2	а	lar	ge size, 4.0 g/p	b	200 g bar, 2.2 g/p	С	500 g tin, 0.64 g/p		
	d	lar	ge jar, 3.8 g/p						
3	lar	ge s	ize						
4	72p, 66p, 70p, 65p; the 3-litre bottle								

- **5** 3 for the price of 2, 1500 g for £3.38
- **6** Hannah's mark, since it is equivalent to 85 out of 100. John's mark is equivalent to 80 out of 100.

Functional Maths Activity: Average speeds

- **1** 60 mph
- 2 Answers will vary, check individual students' responses.
- **3** i 80 mph ii 48 mph
- **4** i 68.6 mph ii 53.3 mph
- **5** Answers will vary, check individual students' responses.

Chapter 8 Algebra: Equations and inequalities

8.1 Solving simple linear equations HOMEWORK 8A

1	а	<i>x</i> = 6	b	<i>y</i> = 7	С	<i>s</i> = 3
	d	<i>t</i> = 11	е	<i>p</i> = 4	f	<i>q</i> = 3
	g	<i>k</i> = 8	h	<i>n</i> = 5	i	<i>a</i> = 6
	j	<i>b</i> = 1	k	<i>c</i> = 14	I	<i>d</i> = 5
2	An	y valid equation, such	as :	$\frac{x}{2} = 12 \text{ or } x - 3 = 21.$		
3	а	A and B both have 18	as	the solution.		
	b	A and C both have the	e x-	term on top.		
	С	B and C both use the	sar	ne letter and numbers.		
4	2 <i>x</i>	= 38, <i>x</i> = 19				
5	10	v = 950, y = 95, I litre c	osts	s 95p		
HC	ME	WORK 8B				
1	а	4	b	2	С	5
	d	6	е	2	f	4
	g	3	h	1	i	5
	j	6	k	10	L	18
	m	12	n	9	0	20
2	$\frac{x}{4}$	+ 2 = 32				
3	2					
HC	ME	WORK 8C				
1	а	1	b	7	С	-2
	d	4	е	5	f	8
	g	3	h	1	i	3.5
	j	14	k	9	I	10
2	An	y valid equation such a	as $\frac{y}{z}$	$\frac{x}{4} + 2 = 8, \frac{x}{6} + 1 = 5$		
3	а	Student 1				
	b	2nd line: Student 2 ac	lds	3 instead of subtracting	g 3.	
		4th line: Student 2 div	vide	s by 2 instead of multip	olyin	g by 2.
HC	ME	WORK 8D				
1	а	3	b	4	С	4
	d	5	е	10	f	6
	g	6	h	3	i	16
	j	6	k	5	L	2
2	а	10	b	14	С	36
3	а	7.5	b	9		

4 48

8.2 Solving equations with brackets

HOMEWORK 8E

1	а	3	b	7	С	1
	d	5	е	6	f	3
	g	2	h	-2	i	-3
	j	1.5	k	1.25	I	1.1

2 a = 5, b = 2 and c = 4

8.3 Equations with the variable on both sides

HOMEWORK 8F

5
U U
0
1

4 x = 4, perimeter = 27 cm

8.4 Setting up equations

HOMEWORK 8G

- **1 a** 3
- **2 a** 24*p* + 100 = 1060 **b** 40p
- 3 a B: 1500 gallons, C: 4500 gallons, D: 3000 gallons

b 4

- **b** 7200 gallons **c** 2400 gallons
- **4 a** 12p 2 = 7 **b** £0.75
- 5 Length is 5 m, width is 4 m and area is 45 m². Carpet costs £13.50 per square metre.
- 6 Derek bought the equivalent of 4 magazines, so 1 magazine costs £1.50, so a book costs £3.00. A book and a magazine together cost £4.50; 22.50 ÷ 4.50 = 5, so Kerry bought 5 magazines.
- 7 years old
- 8 8 years old
- **9** 5
- **10** 6 cm, 6 cm, 5 cm, 10 cm, 5 cm
- 11 crime: 20, science fiction: 28, romance: 17
- **12** 5

13 12

14 a 50p: 10, £1: 20, £2: 14

15 5x + 120 = 3x + 908, 2x = 788, x = 394

16 a 6 **b** 8

c $\frac{n-2}{2}, \frac{n-2}{2}+5$

b £53

³ Zak is wrong. He has not multiplied the brackets correctly, and gets 10x + 3 = 13 in both cases. First equation: x = -0.2, second equation: x = 0.7.

d	$\frac{n-2}{2} +$	$5 = n, \frac{n-2}{2}$	= n - 5, n - 2 = 2n - 10, n = 8
---	-------------------	------------------------	---------------------------------

17 Put any pair of sides equal, e.g. 3x + 1 = 4x - 1 and solve. Solution x = 2. Put 2 into each expression for the sides: all sides equal 7; so the answer is yes, if x = 2.

8.5 Trial and improvement

HOMEWORK 8H

1	а	2 and 3	b	3 and 4	С	9 and 10
	d	6 and 7				
2	3.6	i				
3	а	1 and 2	b	3 and 4	С	4 and 5
	d	4 and 5				
4	а	3.2	b	4.6	С	5.4
	d	7.0				
5	3.5	i i				
6	4.7	,				
7	а	$x^3 + 3x^2 = 1000$	b	9.1 cm		
8	3.3	6				

9 7.6 and 2.6

8.6 Rearranging formulae

HOMEWORK 8I

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

2 $u = v + 10$
3 $y = \frac{T-2}{3}$
4 $q = \sqrt{p}$
5 $q = pL$
6 $b = \frac{2a-1}{5}$
7 **a** 180 **b** $t = \frac{v-u}{10}$ **c** 8
8 **a** 4.30 pm
b i $n = \frac{T-55}{10}$ **ii** 6
9 **a** $6x = 9y - 90$ (or $2x = 3y - 30$), $y = \frac{6x + 90}{9}$ (or $y = \frac{2x + 30}{3}$ **b** 90p
10 First journey time = 1 hour 30 minutes.
Return takes 2 hours. Average speed = 45 mph.
8.7 Solving linear inequalities
HOMEWORK 8J
1 **a** $x \le 5$ **b** $t \ge 8$ **c** $p \ge 8$

•	a	x = 0	D	1 = 0	C	p = 0
	d	<i>x</i> < 3	е	<i>y</i> ≤ 6	f	t > 9

g *x* < 13 **h** $y \leq 11$ i *t* ≥ 37 j *x* < 10 **k** $x \ge 0$ l *t* ≥ 7.5 **2 a** 5, 4, 3, 2, 1 b 1 **c** 25, 16, 9, 4, 1 **d** 5, 3, 1 e 7, 5, 3, 2 **3** 3x + 3.50 < 6, 3x < 2.50, so the most a can could cost was 83p. 4 $6x - 2 \ge 10$, so $x \ge 2$ or $6x - 2 \le 16$, so $x \le 3$. Hence the sides are 2 by 3 or 3 by 5, so the area is between 6 cm^2 and 15 cm^2 . **5 a i** x > 0, x = 2, x < 9ii $x = 3, x \ge 3, x < 2$ **b** Any value between 3 (inclusive) and 9 (not included). **HOMEWORK 8K 1** a *x* ≥ 1 **b** *x* < 2 **c** x > -2 **e** x > -5 f $x \ge -1$ **d** $x \leq 0$ 2 a Ţ b 1 С d е -2 -1 f g Ţ ó ż



5 Any two inequalities that overlap only on the integers 5, 6, 7 and 8; for example, $x \ge 5$ and x < 9.

Problem-solving Activity: Number problems

Establish that the first number, as in the problem, is 3.

Discuss why it cannot be 2 or 5 and make sure students can interpret all the conditions to define the number.

Students' answers will vary.

Chapter 9 Probability: Calculating probabilities

9.1	9.1 Addition rule for events										
НО	ME	WORK 9A									
1	а	$\frac{1}{2}$	b	$\frac{1}{6}$	С	2 3					
2	а	$\frac{1}{2}$	b	$\frac{1}{2}$	С	1					
3	а	$\frac{1}{13}$	b	$\frac{1}{13}$	С	2 13					
4	а	$\frac{3}{10}$	b	$\frac{3}{10}$	С	3 5					
5	а	11 15	b	2 3	С	0					
	d	2 3									
6	а	0.75	b	0.6	С	0.25					
	d	0.6									
	е	i because 3 and bl	ue c	overlap	ii	0.5					
7	а	3 5	b	4 5	С	3 5					
8	а	3	b	Not certain he has 3 of	doub	ole yolks to start with.					
9	$\frac{6}{15}$	or $\frac{2}{5}$									
10	а	10	b	20	С	60					
	d	$\frac{1}{10}$									

11 Each day has to be considered independently and you cannot add their respective probabilities together.

9.2 Experimental probability

HOMEWORK 9B

1	а	$\frac{1}{5}, \frac{3}{20}, \frac{1}{5}, \frac{9}{50}, \frac{17}{100}, \frac{7}{40}, \frac{17}{100}$	b	$\frac{1}{6}$
2	а	$\frac{11}{60} \ , \ \frac{17}{120} \ , \ \frac{7}{40} \ , \ \frac{3}{20} \ , \ \frac{13}{60} \ , \ \frac{2}{15}$	b	20
	С	Yes: all frequencies are close to 20.		
3	а	i 90 ii 60	iii	30
	b	0.4		

- 4 Mon: 0.145; Tue: 0.166; Wed: 0.134; Thu: 0.141; Fri: 0.146
- **5** The spinner could be considered unfair since the 3 only landed 31 times and the majority of the other numbers landed over the anticipated 40 times.
- 6 Although you would expect the probability to be close to $\frac{1}{2}$, hence 25 tails, we know that there is more chance of the number of tails being close to 25 rather than actually 25.

9.3 Combined events

HOMEWORK 9C

1 Check correctly completed sample space diagram.

	а	7				b	2 a	and 1	2		с	$\frac{1}{36}$			
	d	i	$\frac{1}{18}$			ii	$\frac{1}{12}$				iii	$\frac{1}{6}$			
		iv	$\frac{1}{2}$			v	$\frac{1}{6}$				vi	$\frac{1}{4}$			
2	(1, (1,	H), (2 T), (2	2, H), 2, T),	(3, ⊦ (3, T	H), (4), (4,	, H), (T), (((5, H 5, T)	l), (6 <u>,</u> , (6,	, H) T)			-			
	а	$\frac{1}{12}$				b	$\frac{1}{4}$				С	$\frac{1}{6}$			
3	а	(H, 1 (T, 1	1), (H I), (T,	, 2), (2), ((H, 3) T, 3)), (H, , (T, 4	4), (-), (T	H, 5) , 5)	,						
	b	$\frac{3}{10}$													
4	а				-		h								
					2	rst ni 4	amp 6	er 8	10	1					
				2	4	6	8	10	12						
		Sec	ond	4	6	8	10	12	14						
		num	nber	6	8	10	12	14	16						
				8	10	12	14	16	18						
				10	12	14	16	18	20						
	b	i	$\frac{1}{5}$			ii	$\frac{1}{25}$				iii	0			
		iv	4 25			v	9 25								
5	а	$\frac{7}{12}$				b	3 4								
6	$\frac{3}{64}$														
7	₆₄ It v	vill sh	low h	im all	the	possi	ble p	orodu	icts h	ie is al	ble to g	et from	each	combi	nation.
94	1 F 1	nec	tatio	n											
нс				יי											
1	10	0		,											
2	25	0													
3	а	52				b	8				С	4			
_	d	2													
4	18	67													
5 6	то а	100				b	10	0			C	130			
Ū	ď	0				~	10	0			•	100			
7	12	0													
8	а	You	cann	ot ac	ld pro	obabi	lities	for e	event	s like	this.				
~	b	Incre	ease,	as h	e is r	nore	expe	rien	ced.						
9 10	a	33				b ג	83	0/ ~ f	110	ie 100		of 200	en the	v ebou	
10	а 30	∠o u time∘	500 S			U	90	/0 01	112	15 100	.0 001 (JI 200,	รบ เทย	y 5110U	nu witi.
12	Mu	ultiply	the n	umb	er of	stude	ents	by 0.	14						
۳	larp	erColli	ins <i>Pu</i>	blishe	rs 20′	10									00 - 1 -
														Page	e 3∠ of 58

9.	9.5 Two-way tables												
НС	HOMEWORK 9E												
1	а	i	$\frac{1}{6}$			ii	$\frac{1}{4}$					iii	$\frac{1}{6}$
		iv	5			v	$\frac{1}{2}$					vi	29
2	2	1	30			h	11					~	36 1
2	a	<u>6</u>				U	36					C	9
	d	$\frac{3}{4}$				е	$\frac{1}{36}$					f	$\frac{11}{36}$
	g	$\frac{10}{36}$ 0	$r \frac{5}{18}$										
3													
		се	6	-4	-2	0	2	4	6				
		id di	5	-3	-1	1	3	5	7				
		oco	4	-2	0	2	4	6	8				
		n se	3	-1	1	3	5	7	9				
		ore o	2	0	2	4	6	8	10				
		Sce	1	1	3	5	7	9	11				
			<u> </u>	1	2	3	4	5	6				
			-		Sco	re on	first	dice	<u> </u>				
	а	$\frac{1}{12}$	L			b	$\frac{1}{6}$					с	$\frac{1}{2}$
	d	$\frac{1}{5}$				е	$\frac{11}{24}$						L
Л	2	6 1				h	36 1					c	3
-	ŭ	2 1				ь К	2					•	4 7
Э	а	4				D	8					С	8
6	а	$\frac{1}{12}$				b	$\frac{1}{4}$						
7	а	DD,	TD, ł	HD, T	ΓT,	IH, TH	-				1		
	b	Hy	ac	DF	1	DH	Т	Ή	HF	1			
		Tu	lip	DT		DT	T	T	HT				
		Da	۲۲ در		,			<u>ט</u>)			
	<u> </u>	Da	11		, 			<u>ט</u> ייווי~		,			
		1		Da	11	Dan		uiip	ну	ac			
	С	$\frac{1}{4}$				d	Th	ere a	ire re	lative	ly m	ore	daffodils.

- 8 a British: smaller range
 - **b** British: the mean is smaller, so you get more cucumbers in the 5 kg weight.
 - **c** 210 g
- 9 $\frac{17}{36}$
- **10** Either Senuri because she had heavier beans, or Christos because he had longer beans.
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Functional Maths activity: Lottery competition

- 1 This is a problem involving repeated selection without replacement. The probability of Andrew winning will be $\frac{1}{20} \times \frac{1}{19} \times \frac{1}{18} \times \frac{1}{17}$.
- 2 Discuss students' answers. All numbers should have equal probability initially.
- **3** Discuss students' answers. The probability of any employee winning is slim, so the charity should do well.

Chapter 10 Algebra: Patterns

10.1 Patterns in number

HOMEWORK 10A

- **1** 7 × 11 × 13 × 6 = 6006, 7 × 11 × 13 × 7 = 7007
- **2** 3 × 7 × 13 × 37 × 6 = 60 606, 3 × 7 × 13 × 37 × 7 = 70 707
- **3** $7 \times 9 = 8^2 1 = 63, 8 \times 10 = 9^2 1 = 80$
- 4 $7 \times 11 = 9^2 4 = 77, 8 \times 12 = 10^2 4 = 96$
- **5** 9009
- **6** 80 808
- **7** 15 015
- **8** 151 515
- **9** 999 999
- 10 a
 The total is 45 in each case.
 b
 3 × central number

 c
 3 × 2 = 36
 b
 3 × central number

10.2 Number sequences

HOMEWORK 10B

- **1 a** 12, 14, 16; +2 **b** 15, 18, 21; +3 **c** 32, 64, 128; ×2
 - **d** 33, 40, 47; +7 **e** 30 000, 300 000, 3 000 000; × 10
 - f 25, 36, 49; square numbers
- 2 a 34, 55; add previous two terms
 - **b** 23, 30; add one more each time
- **3 a** 112, 224, 448; × 2 **b** 38, 45, 52; + 7
 - **c** 63, 127, 255; add twice the difference each time *or* × 2 + 1
 - d 30, 25, 19; subtract one more each time
 - e 38, 51, 66; add two more each time
 - f 25, 32, 40; add one more each time
 - **g** 13, 15, 16; + 2, + 1
 - **h** 20, 23, 26; + 3
 - i 32, 40, 49; add one more each time
 - j 0, -5, -11; subtract one more each time
 - **k** 0.32, 0.064, 0.0128; ÷ 5
 - I 0.1875, 0.093 75, 0.046 875; ÷ 2
- 4 a Alexander
 - b Jack, Briony, Fran, David, Greta, Ellie, Chris, Isabel, Hermione, Alexander
- **5** No, they will not. The first sequence increases by 6 each time and the second increases by 3 each time. As 6 is a multiple of 3, the terms of the second sequence will always be 4 different from each term in the first sequence, e.g. 5, 1; 11, 7; 17, 13.
- **6** 92, 80, 68, 56, 44, 32, 20, 8

10.3 The *n*th term of a sequence

HOMEWORK 10C

1 a 4, 7, 10, 13, 16 **b** 1, 3, 5, 7, 9 © HarperCollins*Publishers* **2010**

c 6, 10, 14, 18, 22

e 0, 3, 8, 15, 24 **d** 2, 8, 18, 32, 50 **2 a** 3, 4, 5, 6, 7 **b** 3, 7, 11, 15, 19 **c** 1, 5, 9, 13, 17 **e** 3, 9, 19, 33, 51 **d** 2, 5, 10, 17, 26 $1, \frac{2}{3}, \frac{3}{5}, \frac{4}{7}, \frac{5}{9}$ 3 **4** a £290 **b** £490 **c** 6 **d** 4 sessions plus 3 sessions costs \pounds 160 + \pounds 125 = \pounds 285. 7 sessions cost \pounds 255, so he would have saved £30. **5** The fractions are $\frac{2}{3}$, $\frac{3}{5}$, $\frac{4}{7}$, $\frac{5}{9}$, $\frac{6}{11}$, $\frac{7}{13}$, $\frac{8}{15}$, $\frac{9}{17}$, which as decimals are 0.6666..., 0.6, 0.571..., 0.5555..., 0.54545..., 0.5384..., 0.53333..., 0.529..., so only $\frac{3}{5}$ gives a terminating decimal. The denominators that give terminating decimals are power of 5, e.g. 5, 25, 125, 625. **6** 106 - 4n = 6n - 4, rearrange as 6n + 4n = 106 + 4, solve to get n = 11. **HOMEWORK 10D 1** a 2*n* + 3 **b** 4n + 2**c** 5*n* + 1 **d** 6*n* − 3 **e** 3*n* + 1 **f** 7*n*−4 **2** a 101 **b** 201 **c** 253 **d** 296 f 345 **e** 152 **3** a i 7*n* – 2 ii 698 **iii** 103 2*n* + 7 bi ii 207 **iii** 99 **c** i 5*n* – 3 ii 497 iii 102 **d** i 4n-2ii 398 iii 98 or 102 **e i** 8*n* – 3 ii 797 **iii** 101 **f i** *n*+5 **iii** 100 **ii** 105 **4 a** 1000 **b** i $n^3 + 1$ ii $2n^3$ **ii** $\frac{1}{2}n^3$ **5** a 2*k* + 2.5 **b** 2*k* + 3 **c** 2*k* + 4 **e** £2 **d** 2*k* + 5 **6** a 2*n* + 1 **b** 3*n* + 4 2001 c i ii 0.0.666 111 88... 3004 d No, as the bottom includes +4 and the top is only +1 so it will always be less than $\frac{2}{3}$. **10.4 Special sequences HOMEWORK 10E 1 a** 2^{6} (720) 2^{7} (2187) 2^{8} (6561)

1	а	3° (729), 3° (2187), 3°	(65	001)							
	b	i $3^n - 1$	ii	2×3^n							
2	а	even	b	odd	С	even					
	d	even	е	even	f	even					
	g	odd	h	even							
3	10	+ 15 = 25 = 5 ² ; 15 + 2	1 =	$36 = 6^2$							
4	а	С	b	С	С	0					
	d	E									
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So Harry can get to the 17th step before he runs out of counters.

Problem-solving Activity: Pascal's triangle

- **1** 1, 6, 15, 20, 15, 6. 1
 - 1, 7, 21, 35, 35, 21, 7, 1
 - 1, 8, 28, 56, 70, 56, 28, 8, 1
- **2** Each row is symmetrical.

The second diagonal is the integers.

- **3** The triangular numbers.
- **4** 2^{*n*}
- 5 Blaise Pascal (1623–1662) was a French mathematician.

The numbers in Pascal's triangle give the combinations for selecting three items from four, for example, if there are 4 items – A, B, C and D – there are four combinations of three, which are ABC, ABD, ACD, BCD, and there are six combinations of two, which are AB, AC, AD, BC, BD, CD. These are the numbers in the 5th row of Pascal's triangle.

Chapter 11 Geometry: Surface area and volume of 3D shapes

11.1 Units of volume

HOMEWORK 11A

- **1** 24 cm³
- **2** 30 cm³
- **3** 35 cm³
- **4** 40 cm³

11.2 Surface area and volume of a cuboid

HOMEWORK 11B

- 1 a i 72 cm^3 ii 108 cm^2 100 cm^{3} ii 160 cm^2 b i c i 180 cm³ ii 222 cm² 125 cm^{3} ii 150 cm^2 d i **2** 24 cm³, 5 cm, 5 cm, 6 cm **3** 90 m³ **c** 120 cm³ **4 a** 60 cm³ **b** 160 cm^3 **5** 35
- **6** 384 cm²
- 7 NB. In the book the total surface area should be $216 \text{ cm}^2 \text{ not } 21 \text{ cm}^2$. If this were a cube, the side length would be 6 cm, so the total surface area would be $6 \times 6 \times 6 = 216 \text{ cm}^2$ so yes, this particular cuboid could be a cube.

11.3 Surface area and volume of a prism

HOMEWORK 11C

1	а	480 cm ³	b	528 cm ²
2	а	i 10.5 m ²	ii	42 m ³
	b	i 25 m ²	ii	250 m ³
3	а	187.8 g	b	189 g
4	а	344 m ³	b	58
-	~ 7			

- **5** 37
- 6 Fill the 5-litre jug, then from that fill the 2-litre jug twice. There is 1 litre of water left in the 5-litre jug, which can be poured into the glass bottle so that 1 litre can be marked. From there on, it is simple.

11.4 Volume of a cylinder

HOMEWORK 11D

1	а	549.8 cm ³	b	2513.3 cm ³	С	2261.9 cm ³
	d	572.6 cm ³				
2	а	754.0 cm ³	b	117.8 cm ³	С	1460.1 cm ³
3	4.0	kg				
4	а	$176\pi \text{ cm}^{3}$	b	1152π cm ³		
5	а	8100 cm ³	b	35.34 cm ³	С	458
	d	She would only need	1			

- 6 2761 full lorries
- 7 The paper on the roll is 35 cm thick. The number of layers will be $35 \div 0.004 = 8750$. Taking the average radius as 22.5 cm, find the average circumference as $2\pi \times 22.5 = 141.372$ cm, then multiply this by 8750 to get 1 237 002.107 cm, which rounds to 12 370 metres or 12.37 km.

Functional Maths Activity: Baking cakes

- 1 Yes, the volume of the 18 cm tin is 763.4 cm³, the volume of the 25 cm tin is 1472.6 cm³, which is approximately double that of the smaller tin, so she needs to double the amounts of the ingredients.
- **2** The volume of the square tin is 768 cm³, which is close to the volume of the 18 cm circular tin, so she will need 100 g of flour.
- **3** Comparing the volume of the 25 cm circular tin, she would need a tin about 22 cm square.

Chapter 12 Geometry: Transformations 2







12.2 Reflections





.5

f Reflection in y = -x

12.3 Rotations **HOMEWORK 12C** 1 a С A 2 a A С



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A

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- **d** Rotation 90° clockwise about O
- 4 Check students' own designs.
- **5** There will be many different possibilities here, for example, taking the centre triangle as ABC: Rotate 60° clockwise about B, rotate image 180° about B, rotate image 120° anticlockwise about C.



7 C: always true





- 4 Check students' own designs.
- 5 It would have to be drawn with a scale factor of 1.
- 6 By a factor of 16

Problem-solving Activity: Transformation problem 2

Check students' answers. Ask them to explain their reasoning and encourage them to investigate different combinations.

Chapter 13 Geometry: Circles

13.1 Drawing circles

HOMEWORK 13A

- **1 a** Radius 1 cm, diameter 2 cm
 - **b** Radius 2.5 cm, diameter 5.0 cm
 - c Radius 3.0 cm, diameter 6.0 cm
- 2 Check students' circles.
 - a Radius 1.5 cm b Radius 4 cm c Diameter 7 cm
 - d Diameter 9.6 cm
- 3 Check students' accurate diagrams.
- 4 Check students' accurate diagrams. Diameter is 5 cm.
- 5 2.9 cm
- 6 *a* = 12 cm, *b* = 18 cm
- 7 a tangent
 - **b** Check students' diagrams with radius OY drawn.



c It is a right angle.

8 22

13.2 The circumference of a circle

HOMEWORK 13B

1	а	9.4 cm	b	28.3 cm	С	31.4 cm					
	d	37.7 cm	е	66.0 cm							
2	а	12.6 cm	b	22.0 cm	С	44.0 cm					
	d	62.8 cm	е	78.5 cm							
3	48	m									
4	а	314.2 m	b	16							
5	51	.4 m									
6	12.7 cm										
7	15.9 cm										
8	$2\pi(r+1) - 2\pi r = 2\pi r + 2\pi - 2\pi r = 2\pi$										
9	85	0 (2 sf)									
13	3.3 1	The area of a circle									
НС	OME	WORK 13C									
1	а	12.6 cm ²	b	113.1 cm ²	С	201.1 cm ²					
	d	314.2 cm ²	е	452.4 cm ²							
2	а	3.1 cm ²	b	28.3 cm ²	С	78.5 cm ²					
	d	227.0 cm ²	е	490.9 cm ²							
3	а	Yes.									

- **b** A tablecloth with a diameter of 1 metre.
- **4 a** 113.1 m^2 **b** 7 m **c** 153.9 m^2
 - **d** 40.8 m²
 - e No, he needs about 41 square metres and the cost would be close to £500.
- **5 a** 357 m **b** 6963 m²
- **6 a** 15.9 cm **b** 8.0 cm
 - **c** 199.0 cm² (using the value on the calculator for part b); rounded value of 8.0 cm gives 201.1 cm².
- **7** 9.3 cm²
- 8 Choose a value for *d*, the radius will be $\frac{1}{2}d$. Working out the area, using either the diameter or radius, should then give the same answer.

$$A = \pi t^2 = \pi (\frac{1}{2}d)^2$$
, so $A = \frac{\pi d^2}{4}$

9 189.3 cm²

13.4 Answers in terms of π

HOMEWORK 13D

1	а	7π cm	b	10π cm	С	19π cm
	d	6π cm				
2	а	64π cm ²	b	$12.25\pi \text{ cm}^2$	С	81π cm ²
	d	20.25π cm ²				

3 15

- 4 He doubled the radius instead of squaring it; correct answer is 64π cm².
- 5 4 cm
- 6 6 cm

7
$$\frac{20}{\pi}$$
 cm

8
$$\sqrt{\frac{20}{\pi}}$$
 cm

9 a i
$$(4\pi + 8)$$
 cm **ii** 8π cm²
b i $(2\pi + 16)$ m **ii** $(2\pi + 24)$ m²
10 $4a^2 - \pi a^2$

Functional Maths Activity: Track-and-field event measurement

- **1** 9620 m²
- **2** 1608 m²
- **3** 401 m
- **4** 464 m
- 5 30 km/h
- 6 Discuss students' answers. They could try internet searches to explore reasons.

Chapter 14 Geometry: Constructing bisectors and loci

14.1 Bisectors

HOMEWORK 14A

1–4 Check students' own drawings.



- 6 Students should:
 - **a** construct and bisect an angle of 60°, then bisect one of the angles of 30° to get 15°
 - **b** construct an angle of 60°, then use one of its sides to construct an angle of 75° to make 75°.
- 7 Because each angle bisector is the locus of points equidistant from the two sides enclosing the bisected angle; therefore the point where they all meet will be the only point equidistant from all three sides.

14.2 Loci

HOMEWORK 14B







Note: the starting point may be any point along the locus.

10 The smallest number is 4. He can cover the whole courtyard if a camera is placed at the centre of each side. Other arrangements are possible.

HOMEWORK 14C





- 4 a Check students' diagrams.b No c No
- 5 No
- 6 a Check students' diagrams.
 - **b** No
- 7 Between 50 and 210 km
- 8 b: The locus is just two points.

Functional Maths Activity: Loci



- **3** The distance between the centre of the coin and the edge of the box would be halved.
- **4** Similar in the plan view, depending on the size of the marble, but it would be three-dimensional, the height of the radius above the base of the box.
- 5 Discuss students' answers, referring to the hint and the locus described in part 4.

Chapter 15 Algebra: Quadratic graphs





b
$$y = 4$$



x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$y = x^2 + 3$	28	19	12	7	4	3	4	7	12	19	28

b 9.2

c ±2.6



b 8.75

c -0.15, 3.15



5 B and C

6 Car headlights are parabolic in shape and the bulb is at the focus, so that the headlight beam shines straight forward and isn't dispersed all around the car.

Problem-solving activity: Drawing quadratic graphs

The graph of $y = x^2 - ax$ will cross the *x*-axis at (0, 0) and (*a*, 0). The graph of $y = x^2 + bx$ will cross the *x*-axis at (0, 0) and (-*b*, 0).

Chapter 16 Geometry: Pythagoras' theorem

16.1 Pythagoras' theorem

HOMEWORK 14A

- 1 5 cm
- **2** 4.4 cm
- **3** 10.6 cm
- **4** 35.4 cm
- ${f 5}$ a, b, d, f, g, h
- 6 56.6 cm
- 7 One side of square is $\sqrt{\frac{1}{2}}$ of $8^2 = \sqrt{32}$ Area of square = $\sqrt{32} \times \sqrt{32} = 32$

16.2 Finding a shorter side

HOMEWORK 16B

1	а	23.7 cm	b	22.2 cm	С	6.9 cm
	d	32.6 cm	е	8.1 cm	f	760 m
	g	0.9 cm	h	12 m		
2	а	10 m	b	27.2 cm	С	29.4 m
	_					

- **d** 12.4 cm
- **3** 6.7 m
- **4** 224 km
- **5** The sum of the areas of the two smaller semicircles is equal to the area of the larger semicircle.
- 6 An equilateral triangle

16.3 Solving problems using Pythagoras' theorem

HOMEWORK 16C

- **1** 9.0 m
- **2** 3.2 m
- **3** 14.1 m
- **4** 10 km
- 5 3.2 km
- **6 a** 7.9 m
 - **b** 3.9 m
- 7 1.4 units
- **8** 12.0 cm²
- **9** Yes, $41^2 = 40^2 + 9^2 = 1681$
- 10 14.8 units
- 11 616 km
- **12** Diameter 5 cm, height 12 cm or diameter 12 cm, height 5 cm

Problem-solving activity: Pythagoras' theorem

- 1 Check students' answers, may depend on the size of paper!
- 2 Check students' answers.
- **3** For the *n*th triangle drawn, the hypotenuse is $\sqrt{2^2 + n}$.
- 4 Check students' answers, may depend on the size of paper!
- 5 Check students' answers.
- **6** For the *n*th triangle drawn, the hypotenuse is $\sqrt{5^2 n}$.