Lenzie Academy Maths Department



National 4 Pupil Booklet

National 4: Expressions and Formulae

Learr	ning Intention	I can simplify and carr	y out substitu	tions using a	lgebraic express	ions.			
Succe	ess Criteria							0	8
•	I can simplify alg	ebraic expressions.							
		Simplify: $2a + 3a$	5 <i>a</i> +	-2b - 4a	$3 \times a$				
	Extension:	Simplify: $a \times b$	$a \times a$	а	$6a \times a$	$5a \times 4b$			
•	I can use the dist	ributive law and expand	a bracket.						
	Expand: $2(3t)$	$+1) 5(3m-2n^2)$)						
•	I can use the dist	ributive law and simplify	expressions.						
	Expand and simp	blify: $2(3t+1) + 7$	4(2	(k-3) - 5k					
•	I can identify a common factor and factorise an expression.								
	List the factors of	of:	5	8	24	7 y			
	Find the highest	common factor (HCF) of:	5 and 15	4 and 8	14 and 21	9, 12 and 18			
	Factorise:		3p + 12	8p - 4	15t + 35	12d - 18e + 9			
•	I know how to ca	arry out a substitution.							
	1) If $a = 6$, $b = 2$ and $c = -3$ find the value $a + b$ $5a - 3b$ $ab + c$ $\frac{a}{b} + c$ a^2								
	2) The post o	office uses the formula C	$=1\cdot 5F+0\cdot 9$	S to calculat	e the cost of ser	nding small packages			
	Where C i	s the total cost (in £), F is	s first class and	d S is second	d class.				
	Calculate t	he cost of sending 5 pac	kages by first	class and 4 k	by second class.				

Lear	ning Intention	l can co	ntinue	a pat	tern a	nd fin	d a rul	е							
Succ	ess Criteria												0	٢	8
•	l can continue a p Find the next 3 te	attern. rms in the	e follo	wing s	equer	ices:		(a)	5, 9	, 13,	(b)	20, 18, 16,			
•	l can determine th a) Complete the c) Find a formu c) Find D if T is d) Use the form	e formul table an T D la for D ir 17. nula to fir	a for a d know 1 5 n term nd T w	a linea w how 2 9 s of T hen D	r patte v to fin 3 13 = 101	ern an d a fo 4	d use rmula 5	it to ca	n tern 13	ut evaluations ns of T.	and solve	related problems.			













Learning Intention I can interpret statistics using a variety of methods.	rning Intention I can interpret statistics using a variety of methods.								
Success Criteria		:	8						
 I know that mean, median and mode are measures of "average". 									
 I know that range is a measure of spread. 									
 I know how to calculate the mean, median, mode and range from a set of data. 									
Find the range, mean, median and mode of: 1, 3, 3, 3, 4, 4, 6, 10, 11									
 I can use mean, median, mode and range to compare data sets. 									
 I know that a probability value lies between 0 and 1 inclusive. 									
I can calculate the probability of an event occurring.									
When rolling a die what is the probability of getting a number greater than 4?									
I can use probability to make comparisons.									

Learning Intention I can repre	esent data sets	in table and	graph form.					
Success Criteria				\odot		8		
• I know the meaning of discrete a	and continuous	data.						
I can choose appropriate class ir	I can choose appropriate class intervals to group data.							
 I know how to construct a freque Choose an appropriate scale and Construct a frequency table. 	ency table with d interval for th	n class interva ne data:	als. 24, 18, 9, 36, 45, 29, 32, 7, 40, 28, 5, 41, 8, 28, 25.					
 I know how to construct a pie chart. A group of people were asked for their favourite country to go on holiday to. The results are shown in the table: Draw a pie chart to illustrate this information. 								
	Country	Number						
	Italy	6						
	France	10						
	U.S.A.	8						
	Spain	14						
	Scotland	22						
• I know how to construct a stem	and leaf diagra	m.						
• I know how to construct a scatte	ergraph.							
• I can draw a line of best fit on a	scattergraph.							
• I can use a line of best fit to esti	mate one varia	ble given the	other.					

National 4: Relationships



Learning IntentionI can solve linear equations and change the subject of a formula.						
Success Criteria						
I know how to use the balancing method to solve an equation.						
I know to use opposite processes when balancing an equation.						
I know that as equations get more complex, more steps are needed to solve them.						
• I can recognise and solve equations which involve 2 steps: $3x + 5 = 17$ $8p - 11 = 5$						
• I can recognise and solve equations which involve 3 steps: $5t - 2 = 2t + 19$ $7y + 11 = 4y - 19$						
• I can solve equations involving brackets: $3(x-5) = 21$ $5(m+7) - 2(3m-4) = 45$						
• I can solve inequalities of the form: $ax + b < c$ Solve the inequality: $8x - 11 < 5$						
 I can change the subject of a formula using the balancing method. 						
I know that my answer must start with the subject on the left hand side.						
I recognise formulae that can be rearranged in 1 step.						
Change the subject of the formula to x : $x + A = B$ $gx = k$ $\frac{x}{t} = f$						
I recognise formulae that can be rearranged in 2 steps.						
Change the subject of the formula to x : $dx - h = k$ $\frac{d}{x} = g$ $y = 2x + 4$						

Learning IntentionI can use the Theorem of Pythagoras.		
Success Criteria	0	8
I know that the longest side in a right angled triangle is called the hypotenuse.		
I know that the hypotenuse is opposite the right angle.		
• I can use the Theorem of Pythagoras to find the missing side in a right angled triangle.		
 I know that to use the Theorem of Pythagoras I need the length of 2 of the 3 sides in a right angled triangle. Calculate the length of the missing side in each triangle. 5 cm t 8 cm 		



Learning Intention I can use a fractional scale factor to enlarge or reduce a shape.			
Success Criteria	©	•	8
• I know how to use a scale factor to enlarge or reduce a shape. Draw an enlargement of the given shape using a scale factor of $\frac{3}{2}$. Draw a reduction of the given shape using a scale factor of $\frac{1}{2}$.			
 I know how to find a linear scale factor. These rectangles are similar. (a) What is the linear scale factor? (b) Calculate <i>x</i>. 			
• I can solve problems using a linear scale factor. The diagram below shows the design for a house window. Find the value of x . 1.2 m 1.2 m 1			

Learning IntentionI can solve problems using a combination of angle properties.		
Success Criteria	3	8
• I know that when 2 lines cross, the vertically opposite angles are equal.		
 I know that the angles in a triangle add up to 180°. 		
I know the angle properties of an isosceles, equilateral and right angled triangle.		
• I know that the angles in a quadrilateral add up to 360°.		
I know that alternate angles are equal.		
I know that corresponding angles are equal.		
I know that when two parallel lines are crossed by another line		
alternate (Z) and corresponding (F) angles are created.		
Calculate the size of all the missing angles in this diagram.		

Success Criteria	\odot	8
 In the diagram > PQRS is a square PR is a diagonal of the square Triangle RST is equilateral. Calculate the size of angle PTS. 		
 I know that every triangle in a semi-circle is right angled. In the diagram AB is a diameter. If angle ABC = 32°. Calculate the size of angle CAB. 		
 I know that a tangent is a straight line which touches a circle at one point only. I know that a tangent is a straight line which makes a right angle with the radius. 		
 In the diagram > a circle, centre O, is drawn the line AC is a tangent to the circle at B Angle DBA = 70°. Calculate the size of the shaded angle BOE. 		





National 4: Numeracy

Learning Intention I can select and use appropriate numerical notation and units.			
Success Criteria	\odot	٢	8
• When solving problems I can select the appropriate unit when dealing with money, time, length, weight, volume and temperature.			
• When dealing with money I know that £1 = 100p.			
When dealing with time I know that :			
1 year = 12 months, 1 year = 52 weeks, 1 year = 365 days (366 days in a leap year),			
1 day = 24 hours, 1 hour = 60 minutes and 1 minute = 60 seconds.			
• When dealing with length I know that 1 cm = 10 mm, 1 m = 100 cm, 1 m = 1 000 mm and 1 km = 1000 m.			
• When dealing with weight I know that 1 kg = 1000 g and 1 tonne = 1000 kg.			
• When dealing with volume I know that 1 litre = 1000 ml, 1 litre = 1000 cm ³ and 1 ml = 1 cm ³ .			
I know that temperature can be measured in Celsius and Fahrenheit.			

Learning Intentio	n I can select and carry out calculations.		
Success Criteria		0	\odot
I can add and	subtract integers.		
Evaluate:	(a) 3-4 (b) -7 +5		
	(c) A liquid is heated from -11°C to 8°C. By how many degrees has its temperature risen	?	
I can multiply	and divide whole numbers by 10, 100 or a single digit whole number.		
Evaluate:	(a) 23 × 10 (b) 512 × 100 (c) 725 × 8		
	(d) 85 ÷ 10 (e) 703 ÷ 100 (f) 432 ÷ 6		
 I can solve pro A box contain What is the to 			
• I can round ar	nswers to 1 or 2 decimal places.		
Round: (1)	(a) 2.624 to 1 decimal place. (b) 19.029 to 2 decimal places. (c) 4.298 to 2 decimal place	aces.	
(2)	The length of seven pencils is 15cm, 12cm, 9cm, 7cm, 5cm, 10cm and 11cm.		
	Calculate the mean length correct to 2 decimal places.		
• I can round ar	nswers to the nearest significant figure.		
Round: (a) 2	53kg to 2 significant figures. (b) 7140m to 1 significant figure. (c) 16·482 to 3 significant fig	ures.	

Suc	Success Criteria											()	8
•	• I can calculate 1%, 50%, 25%, 75%, 10%, 20%, 33 $\frac{1}{3}$ % and 66 $\frac{2}{3}$ % of a quantity.												
	(1) Calculate 1%, 50%, 25%, 75%, 10%, 20%, 33 $\frac{1}{3}$ % and 66 $\frac{2}{3}$ % of 300ml.												
	(2) In a sale there is a discount of 20%. What is the discount on a desk costing £450?												
•	• I can calculate $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{10}$ and $\frac{1}{5}$ of a quantity.												
	(1) Calculate $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{10}$ and $\frac{1}{5}$ of 60kg.												
	(2) The assem	bly hall ha	s 350 seats	s. At the pr	esentatior	$1 \frac{4}{7}$ of the se	eats were	occupied.	fs 1	M			
	How many	y people w	vere at the	presentati	on?				. /	·			
•	I know equiva	lences bet	ween com	mon fracti	ons, decim	als and per	centages.						
	Percentage	1%	10%	20%	25%	$33\frac{1}{3}\%$	50%	$66\frac{2}{3}\%$	75%	100%			
	Fraction	1	1	1	1	1	1	2	3	100			
		100	10	5	4	3	2	3	4	100			
	Decimal	0.01	0.1	0.2	0∙25	0.333	0.5	0∙666	0.75	1			
	L			L	L	1		I		<u> </u>			

Success Criteria		\odot	:	\odot
•	Starting with the smallest write the following in order of size: 0.404, $\frac{1}{4}$, 41%, 0.04, $\frac{4}{10}$			
•	I can solve a problem involving percentage increase or decrease.			
	The standard cost of a flight to Dubai is £560.			
	Peter decides to pay 15% to upgrade his ticket to first class.			
	What is the cost of a first class ticket?			
•	I can calculate time intervals using the 12 and 24 hour clock.			
	Joe is driving to the ferry terminal. He leaves at 4.40pm and arrives at 22 15.			
	How long does his journey last?			
•	I can calculate distance given speed and time.			
	(1) If I am travelling at an average speed of 50mph what distance have I covered after 2h 30 minutes?			
	(2) The train travels at an average speed of 96 km/h.			
	How far has it travelled in 20 minutes?			





Learning Intention I can explain decisions using numerical results.						
Success Criteria			8			
 When solving problems I can justify an answer by making comparisons related to the results. Two lenders, Mortgages First and Top Mortgage, offer mortgages at different rates on a loan of £120 000. Which mortgage would be better value over a period of 3 years and by how much? Mortgages First Mortgages First Mortgages First Monthly payment £372.50 Plus One-off set-up fee £850 In a trial, Jim scores 12, 9, 4, 5 and 16. In order to get a place on the team he has to score an average of 10 points. Can Jim join the team? Justify your answer by calculation. 						
Learning Intention I can extract and interpret data.						
Success Criteria		:	8			
• I can extract data from different graphical forms including tables, pie charts, bar, line and scatter graphs, stem and leaf diagrams, maps and plans.						

• I can interpret data given different graphical forms including tables, pie charts, bar, line and scatter graphs, stem and leaf diagrams, maps and plans.

Learning Intention I can make and explain decisions using results from the interpretation of data.					
Success Criteria		0		\odot	
• I know the meaning	of trend.				
I can make decisions based on patterns and trends, results of calculations and reading scales.					
When solving proble	ms I can give reasons for the decisions made.				

Learning Intention I can make and explain decisions using probability results.				
Success Criteria			\bigotimes	
I know that a probability value lies between 0 and 1 inclusive.				
I can calculate the probability of an event occurring.				
The National Lottery has balls numbered 1 to 49.				
What is the probability that a ball selected at random, is a number greater than 40?				
I can use probability to make comparisons.				
I can use probability to help make informed decisions.				
When solving probability problems I can give reasons for the decisions made.				