

N4 RELATIONSHIPS 1.1

This resource is to support pupils in passing the appropriate National 4 Assessment Standard. The questions and marking schemes used are from SQA past papers and as such test the topics in their entirety from grade A to C and *may* include other areas from the course. In addition the questions from **Paper 1** (P1) should be completed **without** the use of a calculator and questions from **Paper 2** (P2) permit the use of a calculator.

Each Assessment Standard is used to ensure pupils have the minimum competency on the specified sub-skills for the National 4 course. As such each Assessment Standard will test grade C work on that specific topic.

This resource is divided into two sections:

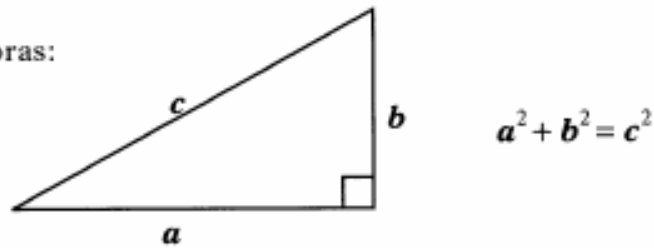
- Section A has an example on each sub skill for the relevant Assessment Standard and the marking scheme for these questions
- Section B has extra practice questions on this Assessment Standard and the marking scheme for these questions

<u>Unit Assessment Standard</u>	<u>Sub skills</u>	Section A – Question Number
Relationships 1.1 Applying algebraic skills to linear equations	The sub-skills are: drawing a graph of a linear equation	Q1
	recognising a graph of a linear equation	Q2 (Vertical) Q3 (Horizontal)
	solving linear equations	Q4
	changing the subject of a formula	Q5

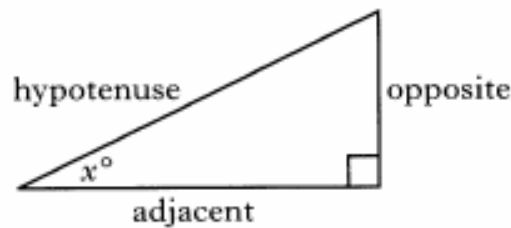
FORMULAE LIST

- Circumference of a circle: $C = \pi d$
 Area of a circle: $A = \pi r^2$
 Curved surface area of a cylinder: $A = 2\pi r h$
 Volume of a cylinder: $V = \pi r^2 h$
 Volume of a triangular prism: $V = Ah$

Theorem of Pythagoras:



Trigonometric ratios
in a right angled
triangle:

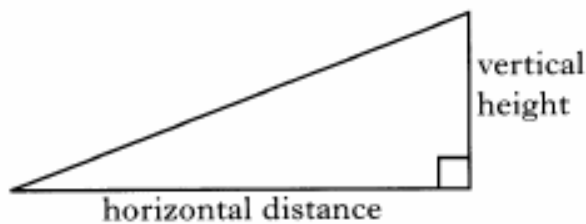


$$\tan x^\circ = \frac{\text{opposite}}{\text{adjacent}}$$

$$\sin x^\circ = \frac{\text{opposite}}{\text{hypotenuse}}$$

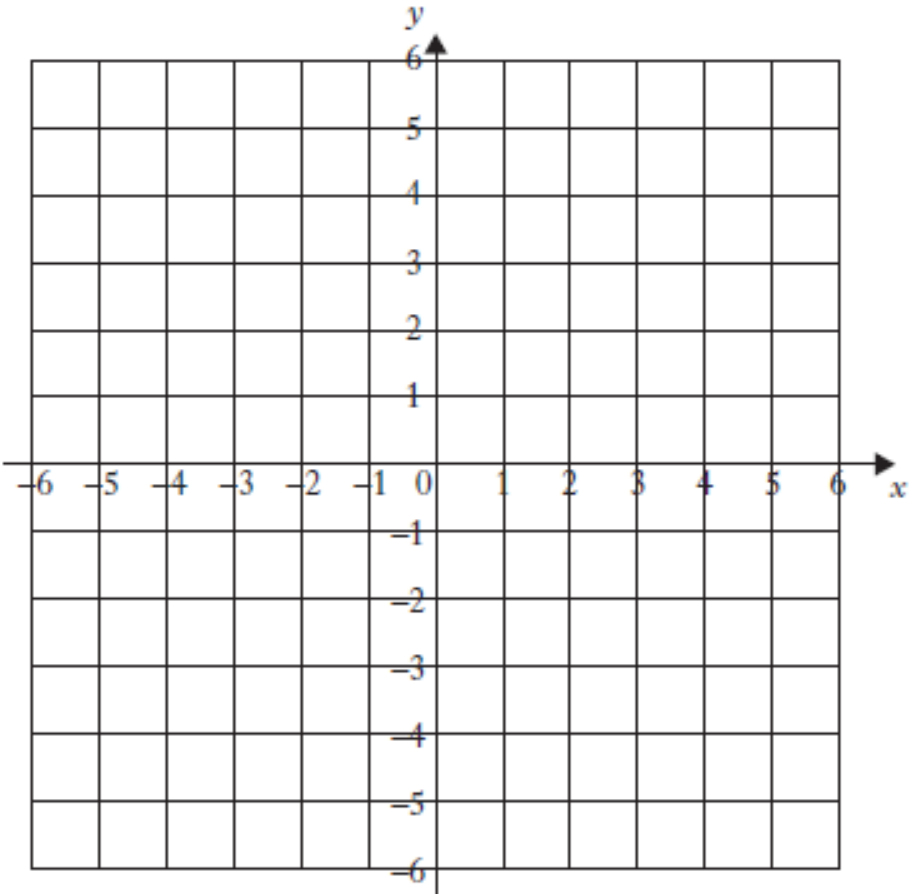
$$\cos x^\circ = \frac{\text{adjacent}}{\text{hypotenuse}}$$

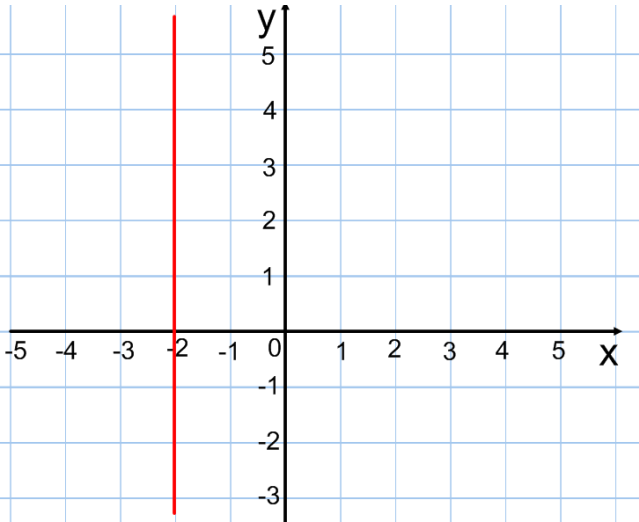
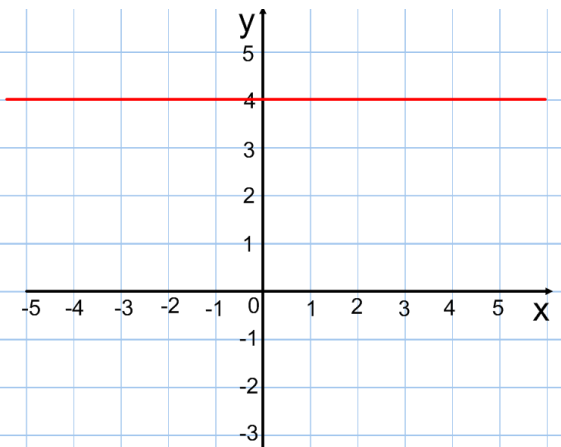
Gradient:



$$\text{Gradient} = \frac{\text{vertical height}}{\text{horizontal distance}}$$

Section A

Q		Marks								
Q1	<p>6. (a) Complete the table below for $y = 2x - 1$.</p> <table border="1" style="margin: 20px auto; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 5px;">x</td> <td style="text-align: center; padding: 5px;">-1</td> <td style="text-align: center; padding: 5px;">1</td> <td style="text-align: center; padding: 5px;">3</td> </tr> <tr> <td style="text-align: center; padding: 5px;">y</td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> </tr> </table> <p>(b) Using the table in part (a), draw the graph of the line $y = 2x - 1$ on the grid below.</p> <div style="text-align: center; margin: 20px 0;">  </div>	x	-1	1	3	y				<p>2</p> <p>2</p>
x		-1	1	3						
y										
P2										

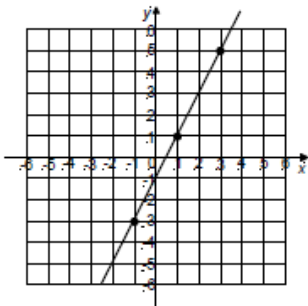
<p>Q2</p>	<p>State the equation of the line shown below:</p> 	<p>1</p>
<p>Q3</p>	<p>State the equation of the line shown below:</p> 	<p>1</p>
<p>Q4 P2</p>	<p><i>(b)</i> Solve algebraically</p> $25 = 7x + 4.$	<p>2</p>
<p>Q5</p>	<p>Change the subject of the following equation to q.</p> $P = 3q - 5$	<p>2</p>

Section A

MARKING

SCHEME

Section A - Marking Scheme

Q			Marks									
Q1 P2	6 (a)	Ans: -3, 1, 5 • ¹ one value correct • ² a further two values correct	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px 10px;"><i>x</i></td> <td style="padding: 2px 10px;">-1</td> <td style="padding: 2px 10px;">1</td> <td style="padding: 2px 10px;">3</td> </tr> <tr> <td style="padding: 2px 10px;"><i>y</i></td> <td style="padding: 2px 10px;">-3</td> <td style="padding: 2px 10px;">1</td> <td style="padding: 2px 10px;">5</td> </tr> </table> <p style="text-align: right; margin-top: 10px;">2K</p>	<i>x</i>	-1	1	3	<i>y</i>	-3	1	5	2
	<i>x</i>	-1	1	3								
<i>y</i>	-3	1	5									
(b)	Ans: line plotted • ¹ 2 points correctly plotted • ² correct straight line drawn	 <p style="text-align: right; margin-top: 10px;">2K</p>	2									
NOTES: In part (b) <ul style="list-style-type: none"> (i) If the line $y = 2x - 1$ is correctly drawn – award 2/2 (ii) For any straight line other than $y = 2x - 1$, the 2nd mark can be awarded if the line passes through all 3 points in part (a) 												
Q2	$x = -2$		1									
Q3	$y = 4$		1									
Q4 P2	(b)	Ans: $x = 3$ • ¹ correct number term • ² correct value for x	• ¹ $(7x =) 21$ • ² $x = 3$	2								
	(iii) In part (b) for $x = 3$ without algebraic working		award 0/2									

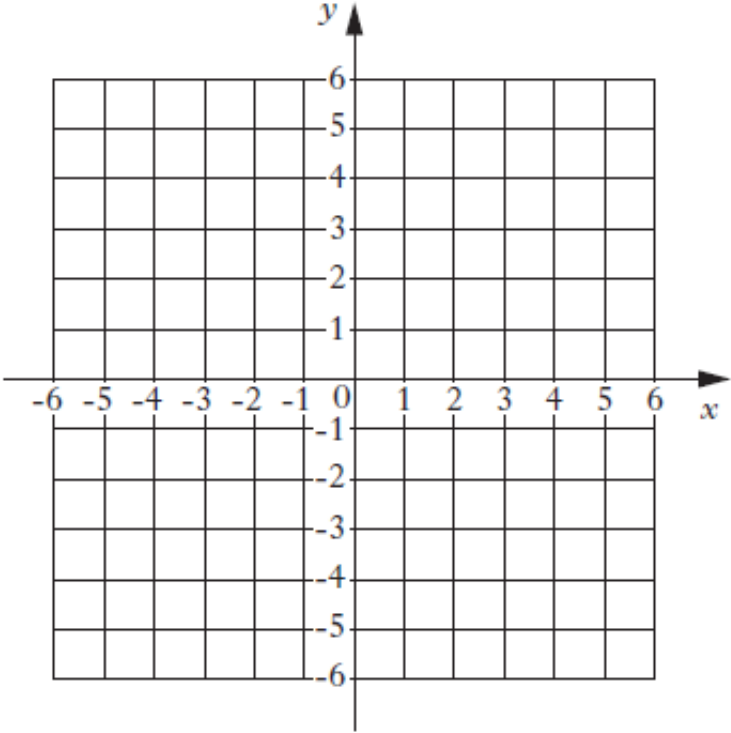
Q5	<ul style="list-style-type: none">• 1 mark for $P + 5$ seen or $\div 3$.• 1 mark for correct answer: $q = \frac{P + 5}{3}$ <p>OR</p> $q = (P + 5) \div 3$	2
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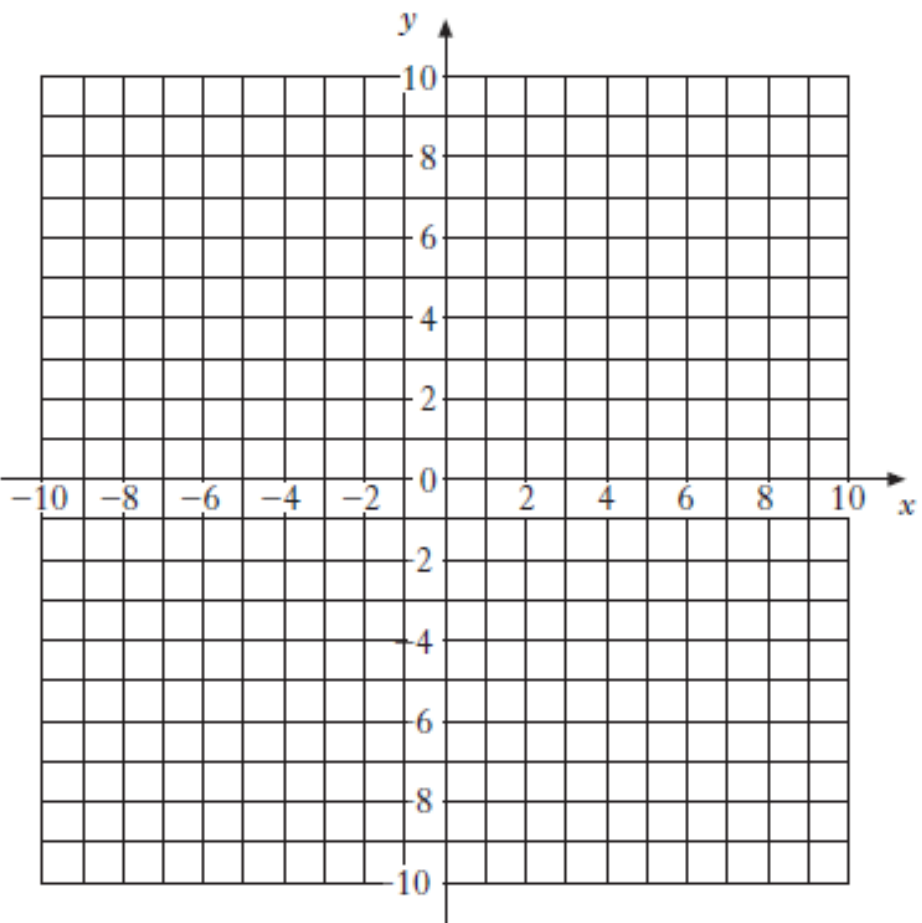
Section B

Section B – Paper 1 – Questions

Q		Marks
1	$y = 4 + w$ make w the subject of the formula	1
2	$P = q - r$ make r the subject of the formula	1
3	$A = LB$ make L the subject of the formula	1
4	$K = \frac{m}{v}$ make m the subject of the formula	1
5	$P = 2L + 2B$ make b the subject of the formula	2
6	$A = \frac{1}{2} (a + b)h$ make b the subject of the formula	3

Section B – Paper 2 – Questions

Q		Marks								
7	<p>4. (a) Complete the table below for $y = 2x - 3$.</p> <table border="1" data-bbox="300 521 991 654"> <tr> <td>x</td> <td>-1</td> <td>1</td> <td>3</td> </tr> <tr> <td>y</td> <td></td> <td></td> <td></td> </tr> </table> <p>(b) Using the table in part (a), draw the graph of the line $y = 2x - 3$ on the grid below.</p> 	x	-1	1	3	y				<p>2</p> <p>2</p>
x	-1	1	3							
y										
8	<p>(b) Solve algebraically</p> $5m - 3 = 37 + m.$	3								

<p>9</p>	<p>8. (a) Solve algebraically</p> $7t - 3 = t + 45.$	<p>3</p>
<p>10</p>	<p>11. (a) On the grid below, plot the points P (-7, -3) and Q (5, 6).</p>  <p>(b) Find the gradient of line PQ.</p>	<p>1</p> <p>2</p>

11	<p data-bbox="188 277 1054 344">9. (a) Solve algebraically</p> $6(2x - 3) = 42.$	3
12	<p data-bbox="172 719 1102 786">4. Solve algebraically the equation</p> $8d + 7 = 5d + 58.$	3

Section B

MARKING

SCHEME

Section B – Paper 1 – Marking Scheme

Q		Marks
1	$w = y - 4$	1
2	$r = q - P$	1
3	$L = A \div B$	1
4	$m = kn$	1
5	$B = (P - 2L) \div 2$ <ul style="list-style-type: none"> • 1 mark subtract 2L seen or $\div 2$ • 1 mark correct answer 	2
6	$b = 2(A \div h) - a$ <ul style="list-style-type: none"> • 1 mark $\times 2$ seen • 1 mark $\div h$ seen • 1 mark correct answer 	3

Section B – Paper 2 – Marking Scheme

Q			Marks
7	<p>4 (a)</p>	<p>Ans: -5, -1, 3</p> <ul style="list-style-type: none"> •¹ one value correct •² a further two values correct 	<ul style="list-style-type: none"> •¹ eg 3 •² eg -1, -5 <p style="text-align: right;">2K</p>
	<p>(b)</p>	<p>Ans: Correct line</p> <ul style="list-style-type: none"> •¹ 2 points plotted correctly •² correct straight line drawn 	<div style="text-align: center;"> </div> <p style="text-align: right;">2K</p>
2			
<p>NOTES:</p> <p>In part (b)</p> <p>(i) If line $y = 2x - 3$ is correctly drawn award 2/2</p> <p>(ii) Where the correct straight line hasn't been drawn, to obtain the 2nd mark the line drawn must pass through all three of the candidate's points</p>			
8	<p>(b)</p>	<p>Ans: $m = 10$</p> <ul style="list-style-type: none"> •¹ number terms gathered correctly •² letter terms gathered correctly •³ correct solution 	<ul style="list-style-type: none"> •¹ 40 •² $4m$ •³ $m = 10$
	<p>(ii) In part (b) for $m = 10$ without algebraic working</p>		<p style="text-align: right;">award 0/3</p>
3			

9	<p>8 (a) Ans: $t = 8$</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">•¹ t terms gathered</td> <td style="width: 50%; padding: 5px;">•¹ $6t$</td> </tr> <tr> <td style="padding: 5px;">•² Number terms gathered</td> <td style="padding: 5px;">•² 48</td> </tr> <tr> <td style="padding: 5px;">•³ Correct solution</td> <td style="padding: 5px;">•³ $t = 8$</td> </tr> </table> <p style="text-align: center; margin-top: 10px;">In part (a) for $t = 8$ without algebraic working – award 0/3</p>	• ¹ t terms gathered	• ¹ $6t$	• ² Number terms gathered	• ² 48	• ³ Correct solution	• ³ $t = 8$	3																								
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• ³ Correct solution	• ³ $t = 8$																															
10	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; padding: 5px;">11 (a)</td> <td style="width: 40%; padding: 5px;">Ans: points plotted</td> <td style="width: 45%; padding: 5px;"></td> </tr> <tr> <td></td> <td style="padding: 5px;">•¹ points P and Q plotted on grid</td> <td style="padding: 5px;">•¹ $(-7, -3)$ and $(5, 6)$ plotted</td> </tr> <tr> <td style="padding: 5px;">(b)</td> <td style="padding: 5px;">Ans: 9/12</td> <td></td> </tr> <tr> <td></td> <td style="padding: 5px;">•¹ correct value of x or y</td> <td style="padding: 5px;">•¹ 9 or 12</td> </tr> <tr> <td></td> <td style="padding: 5px;">•² valid gradient</td> <td style="padding: 5px;">•² 9/12 or equivalent</td> </tr> </table> <p style="margin-top: 10px;">NOTES:</p> <p style="margin-left: 20px;">In part (b)</p> <table style="margin-left: 40px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 5px;">Final answers</th> <th style="text-align: left; padding: 5px;">with working</th> <th style="text-align: left; padding: 5px;">without working</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">9/12</td> <td style="padding: 5px;">2/2</td> <td style="padding: 5px;">2/2</td> </tr> <tr> <td style="padding: 5px;">3/4</td> <td style="padding: 5px;">2/2</td> <td style="padding: 5px;">2/2</td> </tr> <tr> <td style="padding: 5px;">0.75</td> <td style="padding: 5px;">2/2</td> <td style="padding: 5px;">2/2</td> </tr> <tr> <td style="padding: 5px;">4.5/6</td> <td style="padding: 5px;">2/2</td> <td style="padding: 5px;">2/2</td> </tr> </tbody> </table>	11 (a)	Ans: points plotted			• ¹ points P and Q plotted on grid	• ¹ $(-7, -3)$ and $(5, 6)$ plotted	(b)	Ans: 9/12			• ¹ correct value of x or y	• ¹ 9 or 12		• ² valid gradient	• ² 9/12 or equivalent	Final answers	with working	without working	9/12	2/2	2/2	3/4	2/2	2/2	0.75	2/2	2/2	4.5/6	2/2	2/2	1 2
11 (a)	Ans: points plotted																															
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0.75	2/2	2/2																														
4.5/6	2/2	2/2																														

<p>11</p>	<p>9 (a)</p>	<p>Ans: $x = 5$</p> <ul style="list-style-type: none"> •¹ correct multiplication of bracket •² correct gathering of number terms •³ correct solution 	<ul style="list-style-type: none"> •¹ $12x - 18$ •² $42 + 18 = 60$ •³ $x = 5$ 	<p>3</p>
	<p>(b)</p>	<p>Ans: $3(4t + 3u)$</p> <ul style="list-style-type: none"> •¹ correct factor •² correct factorisation 	<ul style="list-style-type: none"> •¹ $3()$ or $(4t + 3u)$ •² $3(4t + 3u)$ 	
<p>In part (a) for $x = 5$ without algebraic working – award 0/3</p>				
<p>12</p>	<p>4</p>	<p>Ans: $d = 17$</p> <ul style="list-style-type: none"> •¹ start to collect like terms: $3d = 51$ •² collect like terms and equate: $3d = 51$ •³ solve for d: $d = 17$ 	<p>3</p> <ol style="list-style-type: none"> 1. For answers without valid working award 1/3 eg (i) $d = 17$ without working (ii) $8 \times 17 + 7 = 5 \times 17 + 58 \rightarrow d = 17$ 2. For the award of the 3rd mark an answer of the form '$d =$' is required 3. Answers acceptable for partial credit (valid working must be shown) <ul style="list-style-type: none"> (a) $3d = 51 \rightarrow 17$ award 2/3 ✓✓× (b) $3d = 65 \rightarrow d = 21.7$ or $21.6(\dots)$ award 2/3 ✓×✓ (c) $13d = 51 \rightarrow d = 3.9(\dots)$ award 2/3 ✓×✓ (d) $13d = 65 \rightarrow d = 5$ award 1/3 ××✓ 	<p>3</p>