National Qualifications 2017

2017 Mathematics Paper 1 (Non-calculator)

N5

Finalised Marking Instructions

Detailed marking instructions for each question.

Question			Generic scheme	Illustrative scheme	Max mark
1.			**Ans: 10** •[1] substitute into x^2+3x •[2] evaluate x^2+3x	•[1] $(-5)^2+3\times(-5)$ •[2] 10	**2**
Notes: 1. Correct answer without working award 0/2 2. Accept $-5^2+3\times-5$ for •[1] 3. For subsequent incorrect working, •[2] is not available					
Commonly Observed Responses: 1. (a) For $-5=(-5)^2+3\times(-5)\rightarrow -5=10$ award 2/2 (b) For $-5=(-5)^2+3\times(-5)\rightarrow -5=10 \rightarrow x=15$ award 1/2 ✓× 2. For $5^2+3\times5=40$ award 0/2 3. For $5^2+3\times(-5)=10$ award 0/2					
2.			**Ans:** 16 •[1] find quartiles •[2] calculate semi-interquartile range	•[1] 218, 250 •[2] 16	**2**
Notes: 1. Correct answer without working award 0/2 2. Accept quartiles indicated in the list or on a diagram for •[1]					
Commonly Observed Responses: 1. For $\frac{267-198}{2}=34\cdot5$ award 0/2					

Question			Generic scheme	Illustrative scheme	Max mark
3.			**Ans:** $\frac{22}{9}$ • [1] start simplification and know how to divide fractions • [2] consistent answer	• [1] $\frac{11}{6}\times\frac{4}{3}$ • [2] $\frac{22}{9}$ or $2\frac{4}{9}$	**2**

Notes:

1. Correct answer without working award 0/2

2. Do not penalise incorrect conversion of $\frac{22}{9}$ to a mixed number

Commonly Observed Responses:

1. $\frac{11}{6}\times\frac{4}{3}=\frac{44}{18}$ award 1/2 ✓×

2. $\frac{11}{6}\times\frac{3}{4}=\frac{11}{8}$ award 1/2 ×✓

3. $\frac{6}{11}\times\frac{3}{4}=\frac{9}{22}$ award 1/2 ×✓

Question	Generic scheme	Illustrative scheme	Max mark
4.	**Ans:** $2x^3-5x^2-10x+3$		**3**
	$\bullet^1$ start to expand	$\bullet^1$ evidence of any 3 correct terms eg $2x^3-8x^2+2x$	
	$\bullet^2$ complete expansion	$\bullet^2$ $2x^3-8x^2+2x+3x^2-12x+3$	
	$\bullet^3$ collect like terms which must include a term in x^3 and a negative coefficient	$\bullet^3$ $2x^3-5x^2-10x+3$	

Notes:

1. Correct answer with no working — award 3/3
2. For subsequent incorrect working, the final mark is not available

Commonly Observed Responses:

1. For eg $2x^3-8x^2+2x+3x^2+12x+3=2x^3-5x^2+14x+3$ — award 2/3 ✓×✓
2. For eg $2x^3+2x-12x+3=2x^3-10x+3$ — award 2/3 ✓×✓
3. For $2x^3+8x^2+2x+3x^2+12x+3=2x^3+11x^2+14x+3$ — award 1/3 ✓××

Question			Generic scheme	Illustrative scheme	Max mark
5.			**Ans:** $B(0,6,6), C(3,3,9)$ $\bullet^1$ Coordinate B $\bullet^2$ Coordinate C	$\bullet^1$ (0,6,6) $\bullet^2$ (3,3,9)	**2**

Notes:

1. The maximum mark available is 1/2 where
   (a) brackets are omitted
   (b) answers are given in component form

2. For (6,6,0) **and** (9,3,3) [repeated error] award 1/2 ×✓

Commonly Observed Responses:

1. For 0,6,6 and 3,3,9 award 1/2 ×✓
2. For $\begin{pmatrix}0\\6\\6\end{pmatrix}$ and $\begin{pmatrix}3\\3\\9\end{pmatrix}$ award 1/2 ×✓
3. For eg $\begin{pmatrix}0\\6\\0\end{pmatrix}$ and $\begin{pmatrix}3\\3\\9\end{pmatrix}$ award 0/2

Question	Generic scheme	Illustrative scheme	Max mark
6.	**Ans:** $y=-2x+4$		**3**
	Method 1: $y-b=m(x-a)$		
	$\bullet^1$ find gradient	$\bullet^1$ $-\frac{8}{4}$ or equivalent	
	$\bullet^2$ substitute gradient and a point into $y-b=m(x-a)$	$\bullet^2$ eg $y-(-2)=-\frac{8}{4}(x-3)$	
	$\bullet^3$ state equation in simplest form	$\bullet^3$ $y=-2x+4$ **or equivalent**	
	Method 2: $y=mx+c$		
	$\bullet^1$ find gradient	$\bullet^1$ $-\frac{8}{4}$	
	$\bullet^2$ substitute gradient and a point into $y=mx+c$	$\bullet^2$ eg $-2=-\frac{8}{4}\times 3+c$	
	$\bullet^3$ state equation in simplest form	$\bullet^3$ $y=-2x+4$ or equivalent	

Notes:

1. Correct answer without working award 3/3

2. BEWARE $\bullet^1$ is not available for $\frac{-2-6}{3-(-1)}=\frac{8}{-4}$ or $\frac{6-(-2)}{-1-3}=\frac{-8}{4}$

Commonly Observed Responses:

1. For a final answer of $y=-\frac{2}{1}x+4$ award 2/3 ✓✓×

2. $y=2x+8$ $[m=\frac{8}{4}\ (-1,6)]$ award 2/3 ×✓✓

3. $y=2x-8$ $[m=\frac{8}{4}\ (3,-2)]$ award 2/3 ×✓✓

4. $m=\frac{4}{4}=1\rightarrow y-6=1(x-(-1))\rightarrow y=1x+7$ award 2/3 ×✓✓

Question	Generic scheme	Illustrative scheme	Max mark
7.	**Ans:** 32 cm^2		**2**
	•[1] correct substitution into area of triangle formula	•[1] $\frac{1}{2}\times 12\times 8\times \frac{2}{3}$	
	•[2] calculate area	•[2] $32\left(cm^2\right)$	

Notes:

1. Correct answer without working — award 1/2

Commonly Observed Responses:

1. For $\frac{1}{2}\times 12\times 8\times \sin\frac{2}{3}=32$ — award 1/2 ×✓
2. For $\frac{1}{2}\times 12\times 8\times \sin\frac{2}{3}$ — award 0/2
3. For $\frac{1}{2}\times 12\times 8=48$ — award 0/2
4. For (a) $\frac{1}{2}\times 12\times 8\times 0\cdot\dot{6}=32$ or $\frac{1}{2}\times 12\times 8\times 0\cdot 666...=32$ — award 2/2
   (b) $\frac{1}{2}\times 12\times 8\times 0\cdot 67=32\cdot 16$ or $\frac{1}{2}\times 12\times 8\times 0\cdot 66=31\cdot 68$ — award 1/2 ×✓
   (c) $\frac{1}{2}\times 12\times 8\times 0\cdot 7=33\cdot 6$ or $\frac{1}{2}\times 12\times 8\times 0\cdot 6=28\cdot 8$ — award 0/2

Question	Generic scheme	Illustrative scheme	Max mark
8.	**Ans:** $x<5$		**3**
	•[1] expand bracket	•[1] $3x-6$	
	•[2] collect like terms	•[2] $-2x>-10$ or $10>2x$	
	•[3] solve for x	•[3] $x<5$ or $5>x$	

Notes:

1. Correct answer without valid working — award 0/3
   Treat guess and check as invalid working

Commonly Observed Responses

1. For $19+x>15+3x-6\rightarrow 2x>-10\rightarrow x>-5$ — award 1/3 ✓××
2. For $19+x>15+3x-2\rightarrow -2x>-6\rightarrow x<3$ — award 2/3 ×✓✓
3. For $19+x>18(x-2)\rightarrow 19+x>18x-36\rightarrow 55>17x\rightarrow \frac{55}{17}>x$ — award 2/3 ×✓✓
4. For (a) $19+x=15+3x-6\rightarrow -2x=-10\rightarrow x=5\rightarrow x<5$ — award 3/3
   (b) $19+x=15+3x-6\rightarrow -2x=-10\rightarrow x=5$ — award 2/3 ✓✓×

Question			Generic scheme	Illustrative scheme	Max mark
9.			**Ans:** 26° **Method 1** $\bullet^1$ calculate size of angle OBD $\bullet^2$ calculate size of angle ODB (ODB = OBD) $\bullet^3$ calculate size of angle CAB **Method 2** $\bullet^1$ calculate size of angle ABC $\bullet^2$ calculate size of angle OCB (OCB = 90 − ABC) $\bullet^3$ calculate the size of angle CAB	 $\bullet^1$ OBD = 32 $\bullet^2$ ODB = 32 $\bullet^3$ CAB = 26 $\bullet^1$ ABC = 32 $\bullet^2$ OCB = 58 $\bullet^3$ CAB = 26	**3**

Notes:

1. Check both methods and award the higher mark.
2. Full marks may be awarded for information marked on the diagram.
3. Where information is not marked on the diagram then working must clearly attach calculations to **named** angles.
4. For an answer of 26° with no relevant working — award 0/3
5. Where candidate uses triangle ABO, $\bullet^3$ is available for ABO = 90 and answer to CAB = 90 − AOB
   eg OBD = 32; AOB = 32; ABO = 90 and CAB = 58 — award 2/3 ✓×✓

Commonly Observed Responses:

Question	Generic scheme	Illustrative scheme	Max mark
10.	**Ans:** $b = \frac{Fc - t^2}{4}$ **or equivalent** •1 multiply by c •2 subtract t^2 •3 divide by 4	•1 $Fc = t^2 + 4b$ •2 $4b = Fc - t^2$ •3 $b = \frac{Fc - t^2}{4}$	**3**

Notes:

1. Correct answer without working 3/3

Commonly Observed Responses:

1. For $b = \frac{c \times f - t^2}{4}$ award 3/3
2. For $b = \frac{t^2 - Fc}{-4}$ award 3/3
3. For $b = \frac{Fc}{4} - \frac{t^2}{4}$ award 3/3

Question			Generic scheme	Illustrative scheme	Max mark
11.			**Ans:** $\frac{3-2a}{a^2}$ •[1] valid common denominator •[2] answer in simplest form	•[1] $\frac{}{a^2}$ or $\frac{}{a^3}$ or $\frac{}{a^2 \times a}$ •[2] $\frac{3-2a}{a^2}$	**2**

Notes:

1. Correct answer without working — award 2/2

2. For subsequent incorrect working, the final mark is not available
   eg $\frac{3-2\cancel{a}}{\cancel{a}^2} = \frac{3-2}{a} = \frac{1}{a}$ — award 1/2 ✓×

3. For $\frac{3}{a^2} - \frac{2}{a} = \frac{1}{a}$ — award 0/2

Commonly Observed Responses:

1. For $\frac{3a-2a^2}{a \times a^2}$ — award 1/2 ✓×

2. For $\frac{3}{a^2} - \frac{2a}{a^2}$ — award 1/2 ✓×

Question	Generic scheme	Illustrative scheme	Max mark
12.	**Ans:** $a=3, b=2$		**4**
	Method 1		
	$\bullet^1$ find $\overline{x}$	$\bullet^1$ $\overline{x}=4$	
	$\bullet^2$ find $\left(x-\overline{x}\right)^2$	$\bullet^2$ 9, 0, 4, 1, 4	
	$\bullet^3$ substitute into formula and start to evaluate	$\bullet^3$ $\sqrt{\frac{18}{4}}$	
	$\bullet^4$ find values of a and b	$\bullet^4$ $a=3, b=2$ or $\frac{3\sqrt{2}}{2}$	
	Method 2		
	$\bullet^1$ find $\sum x$ and $\sum x^2$	$\bullet^1$ $\sum x=20$ and $\sum x^2=98$	
	$\bullet^2$ substitute into formula	$\bullet^2$ $\sqrt{\frac{98-\frac{20^2}{5}}{5-1}}$	
	$\bullet^3$ start to evaluate	$\bullet^3$ $\sqrt{\frac{18}{4}}$	
	$\bullet^4$ find values of a and b	$\bullet^4$ $a=3, b=2$ or $\frac{3\sqrt{2}}{2}$	

Notes:

1. Correct answer without working — award 0/4
2. For $\frac{3\sqrt{2}}{2} \rightarrow a=3, b=\sqrt{2}$ with valid working — award 4/4
3. $\bullet^4$ is only available for simplifying $\sqrt{\frac{m}{n}}$ where m is **not** a perfect square

Commonly Observed Responses:

Question	Generic scheme	Illustrative scheme	Max mark
13.	**Ans:** (2·5, 5·5)		**3**
	•[1] evidence of scaling (match x or y coefficients)	•[1] eg $9x - 3y = 6$ $x + 3y = 19$	
	•[2] follow a valid strategy through to produce values for x and y	•[2] values for x and y	
	•[3] state correct x and y coordinates of P	•[3] $x = 2\cdot5, y = 5\cdot5$	

Notes:

1. Correct answer without working — award 0/3
2. For a solution obtained by guess and check — award 0/3

Commonly Observed Responses:

1. For $x = 2\cdot5, y = 5\cdot5 \rightarrow (5\cdot5, 2\cdot5)$ with valid working — award 3/3

Question			Generic scheme	Illustrative scheme	Max mark
14.	(a)		**Ans:** $a = 5$ •[1] state value of *a*	 •[1] 5	**1**
Notes: 1. Evidence may appear on the graph 2. Accept …$(x+5)^2$….. 3. Where **no answer** appears in (a), check (b) for evidence of $a=5$ eg $8 = (-3+5)^2 + b$					
Commonly Observed Responses:					
	(b)		**Ans:** $b = 4$ •[1] substitute (−3, 8) into equation •[2] state value of b	 •[1] $8 = (-3+5)^2 + b$ •[2] 4	**2**
Notes: 1. Correct answer without working award 2/2 1. Evidence may appear on the graph 2. An incorrect answer in (a) must be followed through (working must be shown) with the possibility of awarding 2/2.					
Commonly Observed Responses: 1. For (a) $a=3$ and (b) $b=8$ with or without working award (a) 0/1 and (b) 0/2					

Question	Generic scheme	Illustrative scheme	Max mark
15.	**Ans:** 6·5		**3**
	Method 1		
	•[1] find scale factor	•[1] $\frac{5}{7}$ or $\frac{7}{5}$	
	•[2] form equation	•[2] $(x=)\ \frac{5}{7}(x+2\cdot6)$ or $\frac{7}{5}x=x+2\cdot6$	
	•[3] find x	•[3] 6·5	
	Method 2		
	•[1] form equation	•[1] $\frac{x}{5}=\frac{x+2\cdot6}{7}$ or equivalent	
	•[2] start to solve	•[2] $7x = 5(x + 2.6)$ or equivalent	
	•[3] find x	•[3] 6·5	
	Method 3		
	•[1] state ratio	•[1] $5{:}2 \equiv x{:}\ 2{\cdot}6$ stated or implied by	
	•[2] start to solve	•[2] $2\cdot6\times\frac{5}{2}$	
	•[3] find x	•[3] 6·5	
	Method 4		
	•[1] state ratio	•[1] $\frac{2}{7}\text{PR}=2\cdot6$	
	•[2] start to solve	•[2] $\text{PR}=\frac{7}{2}\times2\cdot6\quad(=9\cdot1)$	
	•[3] find x	•[3] $(9\cdot1-2\cdot6=)\ 6\cdot5$	

Notes:

1. Correct answer without working — award 0/3

Commonly Observed Responses:

1. $\frac{5}{7}=\frac{x}{2\cdot6}\rightarrow x=\frac{13}{7}$ — award 1/3 ✓××

[END OF MARKING INSTRUCTIONS]