

# National 5 Mathematics

## 2017 Exam - Paper 1

### Worked Solutions

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1.  $f(x) = x^2 + 3x$   
 $f(-5) = (-5)^2 + 3 \times (-5)$   
 $f(-5) = 25 - 15$   
 $f(-5) = 10$  2
2. Lower quartile ( $Q_1$ ) = 218    Upper quartile ( $Q_3$ ) = 250  
  
S.I.Q.R. =  $\frac{250 - 218}{2}$   
S.I.Q.R. =  $\frac{32}{2}$   
S.I.Q.R. = 16 2
3.  $1\frac{5}{6} \div \frac{3}{4}$   
 $= \frac{11}{6} \div \frac{3}{4}$   
 $= \frac{11}{6} \times \frac{4}{3}$   
 $= \frac{44}{18}$   
 $= \frac{22}{9}$   
 $= 2\frac{4}{9}$  2
4.  $(2x + 3)(x^2 - 4x + 1)$   
 $= 2x^3 - 8x^2 + 2x + 3x^2 - 12x + 3$   
 $= 2x^3 - 5x^2 - 10x + 3$  3

5.  $B(0, 6, 6)$        $C(3, 3, 9)$       2

6.  $m = \frac{-2-6}{3-(-1)}$        $y - b = m(x - a)$        $y = mx + c$   
 $m = \frac{-8}{4}$        $y - 6 = -2(x - (-1))$        $6 = -2 \times (-1) + c$   
 $m = -2$        $y - 6 = -2(x + 1)$        $6 = 2 + c$   
                                   $y - 6 = -2x - 2$        $c = 4$   
                                   $y = -2x + 4$        $y = -2x + 4$       3

7.  $\text{Area} = \frac{1}{2} ab \sin C$   
 $\text{Area} = \frac{1}{2} df \sin E$   
 $\text{Area} = \frac{1}{2} \times 12 \times 8 \times \frac{2}{3}$   
 $\text{Area} = 6 \times 8 \times \frac{2}{3}$   
 $\text{Area} = 4 \times 8$   
 $\text{Area} = 32 \text{ cm}^2$       2

8.  $19 + x > 15 + 3(x - 2)$   
 $19 + x > 15 + 3x - 6$   
 $19 + x > 9 + 3x$   
 $19 - 9 > 3x - x$   
 $10 > 2x$   
 $5 > x$   
 $x < 5$       3

9.  $\angle OBE = 90^\circ$   
 $\angle OBD = 90 - 58 = 32^\circ$   
 $\angle ODB = 32^\circ$   
 $\angle BOD = 180 - 32 - 32 = 116^\circ$   
 $\angle COB = 180 - 116 = 64^\circ$   
 $\angle ABO = 90^\circ$   
 $\angle CAB = 180 - 90 - 64 = 26^\circ$       3

$$10. \quad F = \frac{t^2 + 4b}{c}$$

$$\frac{t^2 + 4b}{c} = F$$

$$t^2 + 4b = Fc$$

$$4b = Fc - t^2$$

$$b = \frac{Fc - t^2}{4}$$

3

$$11. \quad \frac{3}{a^2} - \frac{2}{a}$$

$$= \frac{3}{a^2} - \frac{2a}{a^2}$$

$$= \frac{3 - 2a}{a^2}$$

2

$$12. \quad \bar{x} = \frac{20}{5}$$

$$\bar{x} = 4$$

$x$	$x - \bar{x}$	$(x - \bar{x})^2$
1	-3	9
4	0	0
6	2	4
3	-1	1
6	2	4
Totals	0	18

$$\text{s.d.} = \sqrt{\frac{18}{4}}$$

$$\text{s.d.} = \frac{\sqrt{18}}{\sqrt{4}}$$

$$\text{s.d.} = \frac{\sqrt{9 \times 2}}{2}$$

$$\text{s.d.} = \frac{3\sqrt{2}}{2}$$

4

$$13. \quad \begin{array}{r} 3x - y = 2 \quad (\times 3) \\ x + 3y = 19 \\ \hline 9x - 3y = 6 \\ x + 3y = 19 \quad (+) \\ \hline 10x = 25 \\ x = 2.5 \end{array}$$

$$\begin{array}{r} 3x - y = 2 \\ 3 \times 2.5 - y = 2 \\ 7.5 - y = 2 \\ y = 7.5 - 2 \\ y = 5.5 \end{array}$$

P(2.5, 5.5)

3

14a.  $a = 5$  1

14b.  $y = (x + a)^2 + b$

$$8 = (-3 + 5)^2 + b$$

$$8 = 2^2 + b$$

$$8 = 4 + b$$

$$b = 4$$
 2

15. Enlarging linear scale factor =  $\frac{7}{5}$

$$\frac{7}{5}x = x + 2.6$$

$$7x = 5x + 13$$

$$2x = 13$$

$$x = 6.5$$
 3

[END OF WORKED SOLUTIONS]



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