

Y10 November exam 2018 (Alpha) MS

Q1.

12 : 16 or 15 : 12

or $\frac{12}{16}$ or 0.75

or $\frac{16}{12}$ or 1.33

or $\frac{15}{12}$ or 1.25

or $\frac{12}{15}$ or 0.8

oe

M1

20

From accurate working, eg 19.5 rounded to 20 is A0

A1

Additional Guidance

$\frac{16}{12} = 1.3, 1.3 \times 15 = 19.5$

M1, A0

$1.33 \times 15 = 19.995$

M1, A0

$1.3 \times 15 = 19.5$

M0, A0

[2]

Q2.

(a) $(n + a)(n + b)$

Where $ab = \pm 6$

M1

$(n + 1)(n + 6)$

A1

(b) Sight of 11×16

Use of factor tree with one pair of factors of which one is prime or repeated division by primes

M1

$11 \times 2 \times 2 \times 2 \times 2 (\times 1)$

A1

11×2^4

A1

(c) $(ax+b)(cx+d)$

Where $ac = \pm 6$ $bd = \pm 8$

M1

$(3x+8)(2x - 1)$

A1

(d) "2" $(3p+4q)(3p-4q)$

For seeing 2()

B1

Correct difference of 2 squares

B1

[9]

Q3.

Correctly evaluated trial

- eg* $2^6 - 30 = 34$
- $4.1 \rightarrow -12.(8\dots)$ or -12.9 or -13
- $4.2 \rightarrow -11.(6\dots)$ or -12
- $4.3 \rightarrow -10.(3\dots)$
- $4.4 \rightarrow -8.(8\dots)$ or -8.9 or -9
- $4.5 \rightarrow -7.(3\dots)$
- $4.6 \rightarrow -5.(7\dots)$ or -6
- $4.7 \rightarrow -4.(3\dots)$
- $4.8 \rightarrow -2.(3\dots)$
- $4.9 \rightarrow -0.1(3\dots)$

M1

Obtains $4 < x \leq 5$ or better

- eg* $2^5 - 30 = 2$
- $4.95 \rightarrow 0.9\dots$ or 1

M1dep

Obtains $4.9 \leq x \leq 5$ or better
or two correct trials [4.85, 4.95] which
bracket 0

- $4.85 \rightarrow -1.(1\dots)$ or -1.2

A1

Tests 4.95 and concludes 4.9
or two correct trials [4.85, 4.95] which
bracket 0 and concludes 4.9

- Strand (ii)*
- Using 2 dp to ensure 1 dp*

Q1

Additional Guidance

Correct answer with no working

M0M0A0Q0

[4]

Q4.

Alternative method 1

- $4x - 6y = 24$
- $10x + 12y = 6$
- and
- $10x - 15y = 60$

M1

- $9x = 27$
- or $x = 3$
- $27y = -54$
- or $y = -2$

M1dep

$x = 3$ and $y = -2$

- oe*
- SC1 for $x = 3$ and $y = -2$ without
working or using trial and improvement*

A1

Alternative method 2

$$y = \frac{2x - 12}{3}$$

or $y = \frac{3 - 5x}{6}$

$$x = \frac{12 + 3y}{2}$$

or $x = \frac{3 - 6y}{5}$

oe
Rearranging

M1

$$9x = 27$$

or $x = 3$

$$27y = -54$$

or $y = -2$

oe
Elimination of one variable and simplification

M1dep

$$x = 3 \text{ and } y = -2$$

oe
SC1 for $x = 3$ and $y = -2$ without working or using trial and improvement

1

[3]

Q5.

- (a) Cumulative frequencies attempted
8, 18, 32, 40, may be implied by heights on graph

M1

Their heights plotted
Must be increasing function

M1

Plots at correct horizontal position
Must be increasing function

M1

All correct and joined

A1

- (b) Read off from their 20 (= 26)
Allow from 20.5
ft their increasing graph

B1ft

- (c) Read off from their 10 (= 21) and their 30 (= 29.5)
ft their increasing graph

M1

8.5
ft their UQ - their LQ

A1ft

- (d) Comparison of box plots:
Position of Median, UQ and LQ marked on diagram

ft their (b)

B1

UQ and LQ marked on diagram

ft their (c)

A1ft

(On average Jane) is faster due to lower median

oe ft their box plot

B1ft

Jane's times are less consistent due to larger IQR

oe ft their box plot

B1ft

Alternative

Jane's median = 23

B1

Jane's IQR = 13

IQR found from box plot

B1

(On average) Jane is faster due to lower median

oe ft (b) correct comparison of their median values

B1ft

Jane's times are less consistent due to larger IQR

oe ft (c) and Jane's IQR

B1ft

[11]

Q6.

$(5x \pm a)(x \pm b) (= 0) \quad ab = 24$

M1

$(5x - 6)(x + 4) (= 0)$

A1

$1\frac{1}{5}$ and -4

oe eg $\frac{6}{5}$ or 1.2

A1

Alternative method 1

$x = \frac{-14 \pm \sqrt{14^2 - 4(5)(-24)}}{2 \times 5}$

Allow one substitution error but not a conceptual error

M1

$x = \frac{-14 \pm \sqrt{676}}{10}$

or better

A1

$(x =) 1\frac{1}{5}$ and -4

oe

A1

Alternative method 2

$(x + 1.4)^2 - 1.96 - 4.8 (= 0)$

Allow one numerical error

$$x + 1.4 = \pm \sqrt{6.76}$$

$$(x =) 1.2 \text{ and } -4$$

oe

M1

A1

A1

[3]

Q7

$$(a) \frac{3+x}{4} = \frac{9}{5}$$

B1

$$(b) 9(3+x) = 4 \times 5$$

$$3+x = 4 \times \frac{5}{9}$$

M1

$$27 + 9x = 20$$

$$3+x = \frac{20}{9}$$

M1dep

$$9x = 20 - 27$$

$$x = \frac{20}{9} - 3$$

M1dep

$$-\frac{7}{9} \text{ or } -0.77... \text{ or } -0.78$$

oe

A1

Alternative Method 1

$$4(3+x) = 5 \times 9$$

$$3+x = 9 \times \frac{5}{4}$$

M1

$$12 + 4x = 45$$

$$3+x = \frac{45}{4}$$

M1dep

$$4x = 45 - 12$$

$$x = \frac{45}{4} - 3$$

M1dep

$$\frac{33}{4} \text{ or } 8.25$$

oe

A1

Alternative Method 2

$$4(3+x) = 5 \times 9$$

$$3+x = 5 \times \frac{9}{4}$$

M1

$$12 + 4x = 45$$

$$3+x = \frac{45}{4}$$

M1dep

$$4x = 45 - 12$$

$$x = \frac{45}{4} - 3$$

M1dep

$$\frac{33}{4} \text{ or } 8.25$$

oe

A1

Alternative Method 3

$$5(3 + x) = 4 \times 9$$

$$3 + x = 4 \times \frac{9}{5}$$

M1

$$15 + 5x = 36$$

$$3 + x = \frac{36}{5}$$

M1dep

$$5x = 36 - 15$$

$$x = \frac{36}{5} - 3$$

M1dep

$$\frac{21}{5} \text{ or } 4.2$$

oe

A1

Additional Guidance

$$\frac{3}{4} + \frac{x}{4} = \frac{9}{5}$$

M1

$$\frac{x}{4} = \frac{9}{5} - \frac{3}{4}$$

M1dep

$$x = \left(\frac{9}{5} - \frac{3}{4} \right) \times 4$$

M1dep

$$x = \frac{21}{5}$$

A1

If students use a different equation than that chosen in part (a) they can only score a maximum of 3 out of 4, unless they choose the correct equation

[5]

Q8.

Alternative method 1

125 and 512

or

5^3 and 8^3

B1

$400 \div 512 \times 125$

or $125 \div 512$

oe

M1

97.(...)

or 0.24(...)

97.(...) and 100 and Yes A1
 0.24(...) and Yes A1

Alternative method 2

$\sqrt[3]{0.25}$ M1

0.629... or 0.63 A1

$5 \div 8$ M1

0.625 and 0.63 and Yes A1

[4]

Q9.

(a) $12 \times 1.5 (= 18)$ or $8 \times 2.5 (= 20)$ M1
 $20 \times 2.5 (= 50)$ or 12×1

$12 \times 1.5 + 8 \times 2.5$ or $18 + 20$
 $20 \times 2.5 - 12 \times 1$ or $50 - 12$ M1 dep

38 A1

(b) 1.82 or 1.815 or 1.825 seen B1
 oe eg sight of 182, 181.5 or 182.5

30 499 999 or 29 500 000 seen or 29.5 (million) B1
 Accept 30 500 000 or 30.5 (million)

$\frac{\text{their max}}{\text{their min}}$ M1

$\text{their max} > 30\,000\,000$
 $1 < \text{their min} < 1.82$

16 804 407 or 16 804 408 or 16 804 410 or 16 804 400 or 16 804 000 Q1
 Strand (i)
 Correct mathematical notation
 Must be an integer answer
 Accept 16 800 000 or 17 000 000 or 16.8 million or 17 million if first 3 marks awarded
 SC3 16 804 407.16 or 16 804 407.71
 SC1 [16 483 516, 16 483 517]

[7]

Q10.

Indication that they need to swap 20p and 10p B1

$\frac{1}{5}$ or $\frac{2}{4}$ M1

oe

$$\frac{1}{5} \times \frac{2}{4}$$

oe Condone $\frac{1}{5} \times \frac{2}{3}$

M1 dep

$$\frac{2}{20}$$

oe eg $\frac{1}{10}$
SC3 $\frac{2}{15}$ oe

A1

[4]

Q11.

- (a) Readings are at same time/day/place
oe eg *sight of officer affects speeds*
eg *consecutive readings not independent*

B1

- (b) Attempt at frequency density
One frequency ÷ one correct class width

M1

4 correct frequency densities
40, 88, 72, 12

A1

Widths correct
Must have M1

B1

Bars to correct heights and vertical scale
ft but must have M1

B1 ft

(c) $\frac{84}{1000}$

Accept 84 or 7×12 or $(40 - 33) \times \left(\frac{120}{10}\right)$
oe

M1

$$\frac{84}{1000} \times \frac{83}{999}$$

Award for any $\frac{n}{1000} \times \frac{n-1}{999}$; $n < 1000$

M1

[0.0069, 0.0070] or $\frac{581}{83250}$

SC2 0.007056 or $\frac{441}{62500}$
oe

A1

[8]