Maths Predicted Paper

Higher Paper 1 Non-Calculator

MARK SCHEME

**Q1.**

(a)     15.6 ÷ 4    or    156 ÷ 40

 or



*Correctly multiplying both numbers by the same number so that 0.4 becomes an integer*

**M1**

3.9

*oe*

*SC1 digits 39*

**A1**

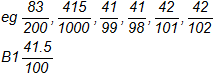
(b)     Any decimal greater than  and less than 



**

**B2**

(c)     Any correct fraction



*or*

*any ‘correct’ fraction with non-integer numerator and/or denominator*

*or*

*any decimal between 41% and 42%*

**B2**

**[6]**

**Q2.**

****

*oe  or *

**M1**

**** or 

*oe with no decimal values*

**A1**

**** or 

**B1ft**

*ft correct simplification of their fraction using the digits 186 and 16(0)*

*ignore incorrect conversion from  to a mixed number*

**Additional Guidance**

Cannot score B1ft from an incorrect mixed number



**M0A0B1ft**

**** implies B1ft

**M0A0B1ft**

**** (incorrect conversion to mixed number)

**M1A1B1**

**** (incorrect simplification of fraction)

**M1A1B0**

**** (incorrect simplification of fraction)

**M1A1B0**

**** (incorrect simplification of fraction)

**M1A1B0**

****

**M0A0B1ft**

****

**M1A0B0**

****

**M1A0B1ft**

**** (simplification does not come from 186 and 16(0))

**M1A0B0**

**[3]**

**Q3.**

**Alternative method 1**

24 ÷ 4 × 3 or 18

*oe*

**M1**

their 18 × 60 or 1080

*oe*

*1080 implies M2*

**M1dep**

1080 and  (of a day)

**A1**

**Alternative method 2**

24 × 60 or 1440

*oe*

**M1**

their 1440 ÷ 4 × 3 or 1080

*oe*

*1080 implies M2*

**M1dep**

1080 and  (of a day)

**A1**

**Alternative method 3**

24 ÷ 4 × 3 or 18

*oe*

**M1**

1000 ÷ 60

or 16(.6…) or 16.7 or 17

*may be seen in either order (M marks not dependent)*

*[16 h 36 m, 16 h 42 m] implies division 16 or 17 may be embedded*

**M1**

16(.6…) or 16.7 or 17 or [16 h 36 m, 16 h 42 m]

and

18 and  (of a day)

*16 or 17 may be embedded*

**A1**

**Alternative method 4**

24 × 60 or 1440

*oe*

**M1**

1000 ÷ their 1440 (× 100)

or  or 0.69… or 69(…)%

*oe*

* or 0.69… or 69(…)% implies M2*

**M1dep**

**** and  and  (of a day)

or

0.69… and 0.75 and  (of a day)

or

69(…)% and 75% and  (of a day)

**A1**

**Additional Guidance**

Ignore units for the M marks but they must be correct, if given, for the A mark

 of 24 is insufficient method unless a correct method or 18 is seen

Once 1000 ÷ 60 or 16 or 16.6… or 16.7 or 17 is seen in Alt method 3, ignore any incorrect conversion to hours and minutes. If the student only shows hours and minutes, they must be in the given range.

Do not accept  (of a day) in equivalent form e.g. 1080 or 18

**A0**

**[3]**

**Q4.**

Divides 8 by 11, showing at least 0.7

**M1**

****

*Strand (i) Correct notation*

*Accept 0.7272…*

**Q1**

**[2]**

**Q5.**

**Alternative method 1**

(*x* =) 0.288.....

and (10*x* =) 2.88.....

*At least two 8s needed*

**M1**

9*x* = 2.6   or  

*oe*

**M1dep**

****

**A1**

**Alternative method 2**

(10*x* =) 2.88.....

and (100*x* =) 28.8.....

*At least two 8s needed*

**M1**

90*x* = 26   or  

*oe*

**M1dep**

****

**A1**

**Alternative method 3**

(1*x* =) 0.288.....

and (100*x* =) 28.8.....

*At least two 8s needed*

**M1**

99*x* = 28.6   or  

*oe*

**M1dep**

****

**A1**

**Alternative method 4**

****

*oe fractions*

**M1**

****

*oe*

*Correct conversion to a common*

*denominator*

**M1dep**

****

**A1**

**Additional Guidance**

Any fraction equivalent to 

**M1 M1 A0**

**[3]**

**Q6.**

4 × 10 or 40

and 2 × 3 or 6

or

 and 

or

0.5 and 0.3

*oe eg 50% and 30%*

**M1**

**** or  or 0.015

*oe eg  or  ×  or 0.5 × 0.3*

**M1dep**

15

**A1**

**Additional Guidance**

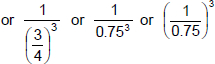
2 : 4 and 3 : 10

**M0**

**[3]**

**Q7.**

****



**M1**

**** or 

*oe fraction, mixed number or decimal*

**A1**

**Additional Guidance**

**** followed by an incorrect attempt to convert to a mixed number

**M1A1**

****

**M0A0**

**[2]**

**Q8.**

**Alternative method 1**

(84 =) (23)4 or 212

or

 or 22

**M1**

2212 and 22

*or calculation in the form*

*2a ÷ 2b where a – b = 10*

*2c × 2d where c + d = 10*

**M1dep**

210

*Accept m = 10*

**A1**

**Alternative method 2**

****

**M1**

1024

**M1dep**

210

*Accept m = 10*

**A1**

**Additional Guidance**

Note that 1024 from 32 × 32 scores 2 marks if 1024 is their final numerical answer

However, if they then try to find  they are clearly processing

, so this would only score 0 marks without further work

If a numerical method and an index method are both attempted and an incorrect answer is given, award up to M1M1 from the better method

**[3]**

**Q9.**

4.5 × 10³ or  

**M1**

0.0045 or  

*SC1 number given in standard form with negative index and then correctly changed to decimal.*

**A1**

**[2]**

**Q10.**

10.8 × 10(5 – 2)  or  10.8 × 103

or 540 000 × 0.02  or  5400 × 2

or 10 800

*oe*

**M1**

1.08 × 104

*SC1 1.1 × 104*

**A1**

**[2]**

**Q11.**

****

*oe eg *

*B2 *

*or*

* and*

* or *

*B1 *

*or  or *

**B3**

**Additional Guidance**

For B1 or B2, allow  for  and  for 



**B3**

**** +  = 

**B2**

**** +  = 

**B2**

**** +  = 

**B1**

**** +  = 

**B1**

**[3]**

**Q12.**

**Alternative method 1**

****

**M1**

****

*implies M1A1*

**A1**

27 with M1A1 seen

**A1**

**Alternative method 2**

****

or



or 

or 

or 

or 

*oe expansion*

**

**

**M1**

75 – 30 – 30 + 12

or

75 – 60 + 12

*implies M1A1*

**A1**

27 with M1A1 seen

**A1**

**Additional Guidance**

27 with no working 

**M0A0A0**

Alt 1 

**M0A0A0**

Alt 2 75 – 30 – 30 – 12

**M1A0A0**

Alt 1 

(condone missing brackets)

**M1A1A1**

Only converting to decimals

**M0A0A0**

**[3]**

**Q13.**

**Alternative method 1**

4 × 5 + *c* = 23

*oe 20 + c = 23*

**M1**

*c* = 3

*implied by (0, 3)*

*or 3 shown as y-axis intercept*

**A1**

*y* = 4*x* + 3

*SC1 y = 4x + c c ≠ 3*

**A1**

**Alternative method 2**

*y* – 23 = 4(*x* – 5)

*oe*

**M1**

*y* – 23 = 4*x* – 20

**M1dep**

*y* = 4*x* + 3

*SC1 y = 4x + c c ≠ 3*

**A1**

**Additional Guidance**

If 3 is clearly linked to *c* in *y* = *mx* + *c* condone M1A1

4*x* + 3 on answer line, *y* = 4*x* + 3 seen in working

**M1A1A1**

4*x* + 3 on answer line, *y* = 4*x* + 3 not seen in working

**M1A1A0**

*m* = 4, c = 3 on answer line, *y* = 4*x* + 3 seen in working

**M1A1A1**

*m* = 4, *c* = 3

**M1A1A0**

*y* = *mx* + 3

**M1A1A0**

23 = 4 × 5 + 3 embedded value for c

**M1A0A0**

4*x* + *c* on answer line with *c* ≠ 3

**M0A0A0**

**[3]**

**Q14.**

(a)  2*x* + 10 = 3*x* − 20

*oe*

*180 − (2x + 10) + 3x − 20 = 180*

**M1**

3*x* − 2*x* = 20 + 10 or *x* = 30

*oe*

**M1dep**

2 × their 30 + 10 or 3 × their 30 − 20 or 70

*oe*

**M1dep**

110

**A1**

**Additional Guidance**

*x* = 30, *y* = 180 − 3(30) + 20 = 110

**M1M1M1A1**

*x* = 30, *y* = 180 − 3(30) − 20 = 110 recovered missing bracket

**M1M1M1A1**

*x* = 30, *y* = 180 − 3(30) − 20 = 70 not recovered

**M1M1M0A0**

2*x* + 10 = 3*x* − 20

3*x* − 2*x* = 20 + 10

*x* = 10

2 × 10 + 10 (= 30)

**M1M1M1A0**

2*x* + 10 = 3*x* − 20

*x* = 10

2 × 10 + 10 (= 30)

**M1M0M0A0**

*y* + 2*x* + 10 = 3*x* − 20 + *y*

**M1M0M0A0**

*w* = 3*x* − 20 seen or on diagram

**M0M0M0A0**

*w* = 2*x* + 10 seen or on diagram

**M0M0M0A0**

(b)  2*x* + 10 = 60 or 2*x* = 60 − 10 or 2*x* = 50 or *x* = 25

**M1**

3 × their 25 − 20 or 55 or 180 − 55 or 125

*oe*

**M1dep**

(*y* =) 125 and bigger or (*y* is) 15 bigger

*oe*

*ft their (a)*

**A1ft**

**Additional Guidance**

Note: A complete logical explanation of the effect of lines not being parallel

eg *w* is smaller so 2*x* + 10 is smaller so *x* is smaller so 3*x* − 20 is smaller so *y* is bigger

**M1M1A1**

2 × 25 + 10 = 60

**M1M0A0**

*y* is bigger ticked but no valid working

**M0M0A0**

**[7]**

**Q15.**

**Alternative method 1**

*x* + 2*x* + 2*x* + 10 or 5*x* + 10

or *x* + 2*x* + 2*x* + 10 + 90

or 5*x* + 100

*oe*

**M1**

*x* + 2*x* + 2*x* + 10 = 360 – 90

or 5*x* + 10 = 270

or *x* + 2*x* + 2*x* + 10 + 90 = 360

or 5*x* + 100 = 360

or 5*x* = 260

*oe*

**M1dep**

(*x* =) 52 or 2*x* = 104

or 2*x* + 10 = 114

*may be on diagram*

**A1**

****

or 0.31(6..) or 0.317 or 0.32

or 31(.6…)% or 31.7% or 32%



**

**B1ft**

**Alternative method 2**

****

or 



*oe*

**M1**

****

*oe*

**M1dep**

(*x* =) 52 or 2*x* = 104

or 2*x* + 10 = 114

*may be on diagram*

**A1**

****

or 0.31(6..) or 0.317 or 0.032

or 31(.6...)% or 31.7% or 32%



**

**B1ft**

**Additional Guidance**

Ignore incorrect simplification or conversion after  oe

**M1M1A1B1**

****

**M1M1**

*x* + 2*x* + 2*x* + 10 followed by 6*x* + 10 = 270

**M1M0**

Do not accept decimal within fraction for final answer if correct fraction not seen

The follow through is not available if A1 awarded

**[4]**

**Q16.**

**Alternative method 1**

35*x* + 6*x* = *ax* or 35 + 6 = *a*

or 41*x* = *ax*

**M1**

a = 41

**A1**

40 + 3*b* = 13

*oe*

**M1**

*b* = −9

*SC3 a = 41, b = –27 or a = 41, b = *

**A1**

**Alternative method 2**

35*x* + 40 + 6*x* + 3*b*

or 41*x* + 40 + 3*b*

**M1**

35*x* + 6*x* = *ax* or 35 + 6 = *a*

**and**

40 + 3*b* = 13

*oe*

*eg 41x = ax and 3b = −27*

**M1dep**

*a* = 41

*implies first M1 only*

**A1**

*b* = −9

*SC3 a = 41, b = −27 or a = 41, b = *

**A1**

**Additional Guidance**

*a* = 41 and *b* = −9

**M1A1M1A1**

*a* = 41 or *b* = −9

**M1A1**

35*x*, 40, 6*x* and 3*b* seen without addition signs shown or implied

**M0**

35*x* + 40 + 6*x* + *b* leading to an answer of *a* = 41 and *b* = −27

**SC3**

35*x* + **8** + 6*x* + 3*b* leading to an answer of *a* = 41 and *b* = 

**SC3**

35*x* + **8** + 6*x* + *b* leading to an answer of *a* = 41 and *b* = 5

**M1A1**

a = 41*x*

**M0**

For  accept 1.66... or 1.67

Condone multiplication signs eg 35 × *x* for 35*x*

**[4]**

**Q17.**



**B1**

**[1]**

**Q18.**

 or 

*oe*

**M1**

**** +  = 

**A1**

**[2]**

**Q19.**

*x* (2*y* − 3)  or  2*xy* − 3*x*

*oe*

**M1**

2*xy* − 3*x*  =  5*y* + 4

*oe*

**M1dep**

2*xy* − 5*y*  =  3*x* + 4

or  *y*(2*x* − 5)  =  3*x* + 4

or  5*y* − 2*xy*  =  −3*x* − 4

or  *y*(5 − 2*x*)  =  −3*x* − 4



**M1dep**

****

**A1**

**Additional Guidance**

If there is choice mark the working linked to the answer line

2*xy* − 3*x*  =  5*y* + 4   is  M1M1 as minimum

2*xy* − 5*y*  =  3*x* + 4 or *y*(2*x* − 5)  =  3*x* + 4 is M1M1M1 as minimum

Condone  *x*  ×  (2*y* − 3)

**M1**

**[4]**

**Q20.**

(a)     *y* = tan *x*

**B1**

(b)     *y* = 2*x*

**B1**

**[2]**

**Q21.**

Fully correct curve

and

point (0, –2) indicated

*B1 fully correct curve*

*or*

*partially correct curve with point (0, –2) indicated*

**B2**

**Additional Guidance**

A partially correct curve must

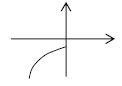
start in the 3rd quadrant and finish in the 1st quadrant, passing through the 4th quadrant

not include a section with negative gradient

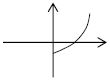
A fully correct curve must

have all the properties of a partially correct curve

have only a decreasing gradient to the left of the *y*-axis



have only an increasing gradient to the right of the *y*-axis



Condone a positive gradient at the y-intercept

Condone straight line segments at each end of the curve

Fully correct curve with y-intercept labelled –2

**B2**

Partially correct curve with y-intercept labelled –2

**B1**

*y*-intercept labelled (–2, 0) is incorrect and can score a maximum of B1

Ignore any numbers on the axes other than the *y*-intercept

*y*-intercept (0, – 2) stated does indicate the point (0, –2)

**Additional Guidance**

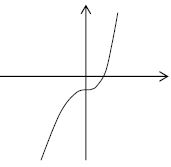
Unlabelled notches do **not** indicate the point (0, –2)

A table of values does **not** indicate the point (0, –2)

Graph consisting only of straight lines

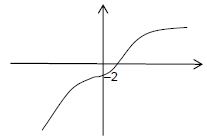
**B0**

A fully correct curve but point (0, –2) is not indicated



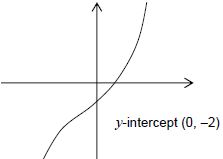
**B1**

Partially correct curve with point (0, –2) indicated



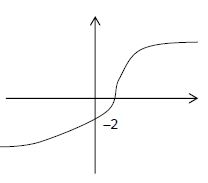
**B1**

Fully correct curve with point (0, –2) indicated



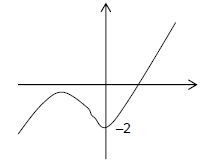
**B2**

Partially correct curve with point (0, –2) indicated



**B1**

Curve includes a negative gradient so not partially correct



**B0**

**[2]**

**Q22.**

(a)     3

**B1**

(b)     Correct attempt at full area

eg1  × 5 × 5 + 5 × their 3 +  × 4 × 5

(= 12.5 + 15 + 10)

eg2  × (12 + their 3) × 5

(= × 15 × 5)

*ft their 3 from (a) for M2 and M1*

*M1 Correct attempt at a relevant area*

**

*eg 2 5 × their 3 (= 15)*

**

*eg 4 Counting squares*

**M2**

37.5

*oe*

*ft from M2 and their 3 from (a)*

**A1ft**

(c)     1

**B1**

(d)     acceleration

**B1**

**[6]**

**Q23.**

Draws the line *x* = −3 as a dashed line

*at least from y = 0 to y = 5*

**B1**

Draws the line *x* + *y* = 2 as a solid line

*at least from x = −3 to x = 2*

**B1**

Draws the line y =  as a solid line

*at least from x = −3 to x = 2*

**B1**

Correctly labels or shades the region satisfying all three inequalities

*ft their three lines*

**B1ft**

**Additional Guidance**

Only withhold a mark for an incorrect line style on the first occasion

With only one or two or with four or more lines drawn it is impossible to score the last B1

**[4]**

**Q24.**

(a)     *D*

**B1**

(b)     *C*

**B1**

(c)     *E*

**B1**

**[3]**

**Q25.**

**Alternative method 1**

(second differences =) 4

or 2*n*2 or *a* = 2

*second difference seen at least once and not contradicted*

**M1**

11 − 2 × 12 and 26 − 2 × 22 and

45 – 2 × 32 (and 68 – 2 × 42)

or

9 and 18 and 27 (and 36)

or 9*n*

**M1dep**

2*n*2 + 9*n*

*oe*

**A1**

**Alternative method 2**

any two of

*a* + *b* + *c* = 11

4*a* + 2*b* + *c* = 26

9*a* + 3*b* + *c* = 45

16*a* + 4*b* + *c* = 68

**M1**

3*a* + *b* = 26 − 11

and 5*a* + *b* = 45 − 26

or

*a* = 2 and *b* = 9 (and *c* = 0)

*oe*

*obtains two correct equations in same two variables from their equations*

**M1dep**

2*n*2 + 9*n*

*oe*

**A1**

**Alternative method 3**

(second differences =) 4

or 2*n*2 or *a* = 2

*second difference seen at least once and not contradicted*

**M1**

3*a* + *b* = 26 − 11

and substitutes *a* = 2

or *b* = 9 or 9*n*

**M1dep**

2*n*2 or 9*n*

*oe*

**A1**

**[3]**