

# MAN vs MATHS

## Year 9 Mathematics Practice Exam #1 Answers

### Notes to marking:

- Correct answers will gain full marks unless working is specifically required or for an E grade. To be "working" it must be clearly laid out in logical sequence – the mere presence of numbers written down does not automatically count as working.
- Incorrect answers with full and correct working may be awarded a grade, provided the mistake was an entry error or similar, not a misunderstanding.  
e.g.  $3\%$  of 40 =  $3 \div 100 \times 40 = 12$ , rather than 1.2, is clearly entering 10 for 100 or 400 for 40 in the calculator and can be given full marks.  
However  $4 \times 3^2 = 24$  arises when a student mistakes  $3^2$  for  $3 \times 2$ , which is an not a mechanical error, and cannot be given a mark.
- Almost correct answers gain **no** marks even if it is clear that the student has made a simple mistake (e.g. writing 12 for 3% of 40) if there is no working shown. Students should show all working to avoid this situation.
- Incorrect or inappropriate rounding is not penalised unless specifically noted.
- Full marks can be given if a question is correctly solved but using the wrong answer from a separate previous question (usually these will be indicated "allow COE", for carry-over error)
- Algebra questions must be solved algebraically. A correct answer is insufficient if it is found via non-algebraic methods  
e.g. in solving  $3x + 3 = 5x + 7$  it is not sufficient to state that  $3 \times -2 + 3 = 3$  and  $5 \times -2 + 7 = 3$  and so the answer is  $x = -2$ .
- In general a multi-part "M" question with one complete step correctly answered (with working) but a single mistake may be given an "A".
- An "E" question with working shown and only one error may given an "M", provided it is clear that the student has sufficient understanding.

### Notes to Grades:

- For each section the required number of questions for each grade level is shown. The grade boundaries shown are **indications** only. The standard in the actual exam may be higher or lower.
- Higher grade answers may count down, but lower grades never count up.  
7 "A" and 3 "M" answers has more than the 9 questions to reach the Achieved grade in Number, as the "M" can count down as "A".  
5 "M" and 1 "E" does not get Excellence in Number.

# Number

The boxes show the required number of questions for each grade level

Achieved	Merit	Excellence
<b>12</b>	<b>4</b>	<b>2</b>

## QUESTION ONE

- a)  $\frac{23}{100}$       **A**
- b) **0.23**      **A**
- c) **23%**      **A**

## QUESTION TWO

- a)      **-6.5, -6, -5, 8.103, 8.15, 8.2**      **A**
- b) i)    **5.44**      **A**      Accept exactly "5.44" only
- ii)    **0.50**      **A**      Accept exactly "0.50 " only – "0.5" is not correct
- c) i)    **0.048**      **A**      Accept exactly "0.048" only
- ii)    **1.857**      **A**      Accept exactly "1.857" only

## QUESTION THREE

- a) i)     $\frac{7}{2}$       **A**
- ii)     $\frac{12}{5}$       **A**
- b) i)     $2\frac{5}{6}$       **A**
- ii)     $1\frac{1}{5}$       **A**      Do not accept  $\frac{6}{5}$ , as this is not a mixed number

## QUESTION FOUR

- a)  $\frac{17}{100} \times 150$       or       $0.17 \times 150 =$       **25.5**      **A**
- b)  $\frac{7}{19} = 0.368421$        $0.368421 \times 100(\%)$       **36.84%**      **A**

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- c)  $\frac{8}{100} \times 40 = 3.2$      $40 - 3.2$     or     $0.92 \times 40$     **\$36.80**    **M**    A if no \$ sign and "36.8"  
 but not "36%" or "37%" without working
- d)  $\frac{7}{58} = 0.120689$      $0.120689 \times 100(\%)$     **12.1%**    **M**    or any correct rounding  
 A if "12%" with no working

### QUESTION FIVE

$-423 + 500$     **77m**    **A**    units not required

### QUESTION SIX

- a)  $\frac{3}{8} \times 24 = 9$      $24 - 9$     or     $\frac{5}{8} \times 24$     **15 (cars)**    **A**
- b)  $15 + 10 = 25$      $\frac{56}{100} \times 25 = 14$      $25 - 14$     **11 (cars)**    **M**    allow COE
- c)  $\frac{13}{24} = 0.541666$      $0.541666 \times 100(\%)$     **54.2%**    **M**    allow COE  
 A if "54%" or "54.1%" with no working

### QUESTION SEVEN

$\frac{40}{100} \times 55 = \$22/\text{week}$      $350 \div 22 = 15.9$     **16 (weeks)**    **E**    M for "15.9"

### QUESTION EIGHT

$60500 \div 1.1 =$     **\$55,000**    **E**    No mark for \$54,450

### QUESTION NINE

15 bracelets cost \$500. She sells 15 for  $49 \times 15 = \$735$

She keeps  $0.95 \times 735 = \$698.25$  after commission ( $0.95 \times 735$ , or  $735 - \frac{5}{100} \times 735$ )

That means she makes  $698.25 - 500 = 198.25$  profit

15 bracelets take 5 hours to make and  $15 \times 0.5 = 7.5$  hours to pack and send = 12.5 hrs total

$198.25 \div 12.5 =$     **\$15.86/hour**    **E**  
 Allow minor errors in rounding  
 M if layout not clear and easy to follow

alternatively, if done in singles

Each bracelet takes  $500 \div 15 = \$33.33$  to make one

She keeps  $0.95 \times 49 = \$46.55$  after commission ( $0.95 \times 49$ , or  $49 - \frac{5}{100} \times 49$ )

Her profit per bracelet is  $46.55 - 33.33 = \$13.22$

Each bracelet takes 20 minutes to make + 30 to sell, so 50 minutes =  $\frac{50}{60}$  hours (or 0.8333 h)



$$13.22 \div \frac{50}{60} =$$

**\$15.86** per hour

# Algebra and Graphs

The boxes show the required number of questions for each grade level

Achieved	Merit	Excellence
<b>12</b>	<b>9</b>	<b>5</b>

## QUESTION ONE

- a)  $2 \times 5 \times 4 =$  **40** **A**
- b)  $4 + -2 =$  **2** **A**
- c)  $(-2) \times (-2) =$  **4** **A**
- d)  $(-2 - 4) = -6$        $(-6)^3 =$  **-216** **M**

## QUESTION TWO

The mid-way equations in red **must** be shown, somewhere, for M – or the maximum mark is A.  
The grey working need not be shown, although students are encouraged to show all working.

- a)  $x + 15 = 2$        $x = -13$       **A**  
 $-15$      $-15$
- b)  $2.4x = 18$        $x = 7.5$       **A**  
 $\div 2.4$      $\div 2.4$
- c)  $5n - 2 = 24$        $n = \frac{26}{5}$  or **5.2**      **M**  
 $+2$      $+2$   
 $5n = 26$   
 $\div 5$        $\div 5$
- d)  $2 = 17 + 5x$        $x = -3$       **M**      A for  $x = \frac{-15}{5}$   
 $-17$      $-17$   
 $-15 = 5x$   
 $\div 5$        $\div 5$
- e)  $8x + 11 = 5x + 19$        $x = \frac{8}{3}$  or 2.66      **M**      accept any rounding  
 $-5x$      $-11$        $-5x$      $-11$   
 $3x = 8$   
 $\div 3$        $\div 3$

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### QUESTION THREE

a)  $0.25n + 7 = 0.5n$  or  $0.25n = 0.5n - 7$  **M** accept  $x$  instead of  $n$   
 $0.25n$  can be replaced by  $\frac{1}{4}n$ ,  $\frac{n}{4}$  etc and  $0.5n$  can be replaced by  $\frac{1}{2}n$ ,  $\frac{n}{2}$  etc

b)  $0.25n + 7 = 0.5n$   
 $-0.25n$   $-0.25n$   
 $7 = 0.25n$  **n = 28** **E** M for  $\frac{7}{0.25}$  etc  
 $\div 0.25$   $\div 0.25$

allow COE for **small** mistake in a) – especially wrong + or – in front of the 7 giving  $n = -28$   
**No** marks are to be awarded for a correct solution that does not carry over an equation from part a) and have the shown mid-step – such as showing  $\frac{1}{4}$  of 28 is seven less than  $\frac{1}{2}$  28.

### QUESTION FOUR

a)  $25 = 7p + 8.2$  or  $7p + 8.2 = 25$  **M** accept  $25 - 8.2 = 7p$  etc

b)  $25 = 7p + 8.2$   
 $-8.2$   $-8.2$   
 $16.8 = 7p$  **p = \$2.40** **E** M for  $\frac{16.8}{7}$  etc  
 $\div 7$   $\div 7$

**No** marks are to be awarded for a correct solution that does not carry over an equation from part a) and have the shown mid-step – such as showing  $7 \times 2.4 + 8.2 = 25$

### QUESTION FIVE

- a) **6d** **A** no alternatives
- b) **4kh** **A** or  $4hk$  – no other alternatives
- c)  **$4x^2 + 10x$**  **A** or  $10x + 4x^2$  – no other alternatives
- d)  **$p^3$**  **A** no alternatives
- e)  $20x + 8 - 15x$  **A**  
**=  $5x + 8$**  **M** or  $8 + 5x$  – no other alternatives  
**no** mark if student continues and gives  $5x + 8 = 13x$

### QUESTION SIX

- a)  **$n + 4$**  **A** or  $4 + n$  – no other alternatives
- b)  **$(5x)^2$**  **M** or  $25x^2$  or  $5x \times 5x$  – no other alternatives

### QUESTION SEVEN

a)  $x + (x + 6) + 8$   
 $= 2x + 14$

A any order, brackets not required

M or  $14 + 2x$  – no other alternatives

no mark if student continues and gives  $2x + 14 = 16x$

b)  $\frac{1}{2} \times x \times 8$   
 $= 4x$

A any order

M or  $4 \times x$  – no other alternatives

### QUESTION EIGHT

a)  $4x + 12$

A no mark if student continues and gives  $4x + 12 = 16x$

b)  $2k^2 - 8k$

A no alternatives. No mark if student continues

c)  $k^2 + 2k - 4k - 12$   
 $= k^2 - 2k - 12$

M

E any order, negatives must be correct

### QUESTION NINE

a)  $6(x + 3)$

A no alternatives. No mark if student continues

b)  $8(1 - 2k)$

M no alternatives. No mark if student continues

c)  $p(2 + p)$

A or  $p(p + 2)$  no other alternatives.

d)  $3x(x + 5y)$

E no alternatives. No mark if student continues

### QUESTION TEN

a) 3, 7, 10, 13, **16**

A

b) 9, 6, 3, 0, **-3**

A

c) 3, 6, 12, 24, **48**

A

### QUESTION ELEVEN

a) **-4**

A

b) **2**

M

c)  $y = 2x - 4$

E or  $y = 2x + -4$  etc

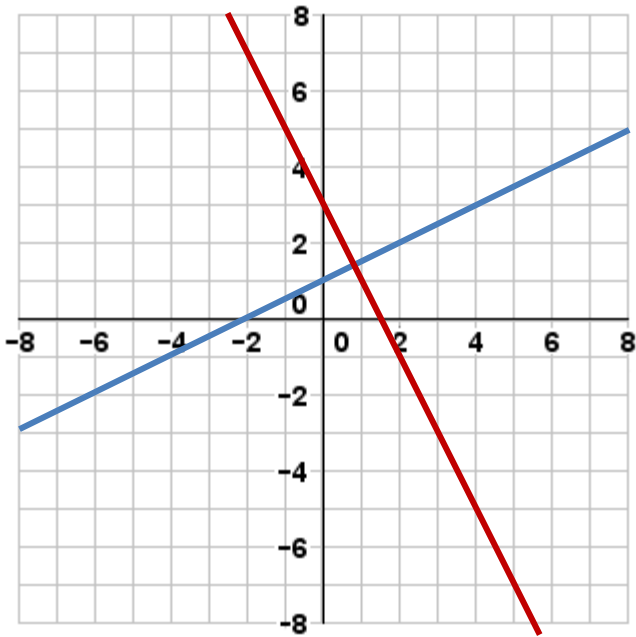
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**QUESTION TWELVE**

$W = 2W - 2$

**M** or  $W = 2W + -2$  etc

**QUESTION THIRTEEN**



a)  $y = \frac{1}{2}x + 1$  **E** or  $y = 0.5x + 1$  etc

b) **line drawn as shown** **M** must cross  $(0, 3)$  and  $(1.5, 0)$  but may be shorter than shown

**QUESTION FOURTEEN**

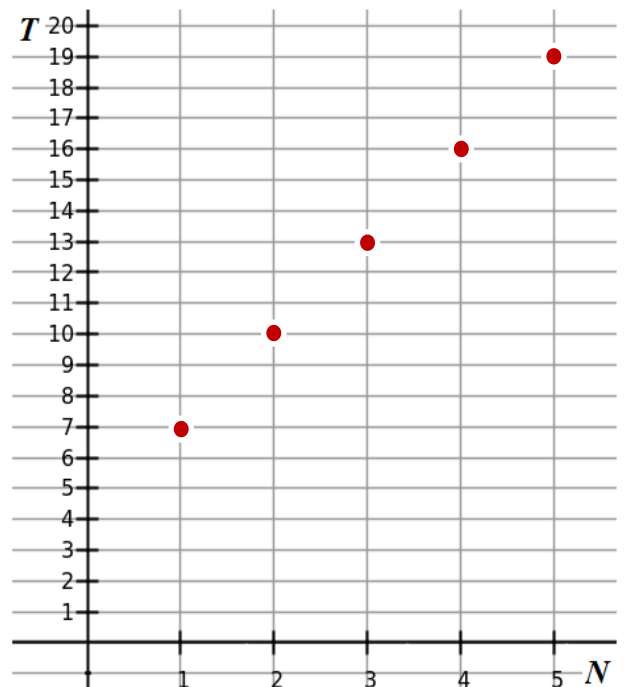
a) see table below **A**

1	7
2	<b>10</b>
3	<b>13</b>
4	<b>16</b>
5	<b>19</b>

b) **As shown to right** **M**  
do not deduct mark if line added

c)  $D = 3N + 4$  **E**  
**M** for  $y = 2x + 5$

d)  $157 = 3N + 4$   
 $153 = 3N$   
**N = 51** **E**  
but only if solved by the equation,  
otherwise **M**





# Measurement

The boxes show the required number of questions for each grade level		
Achieved	Merit	Excellence
<b>8</b>	<b>4</b>	<b>2</b>

## QUESTION ONE

- a) **0.38** km or **0.380**
- b) **7500** mg **A** if a) and b) both correct
- c) **4800** cm<sup>3</sup>
- d) **5** minutes **A** if c) and d) both correct
- e) **132** minutes **A**

## QUESTION TWO

- a)  $2 + 0.8 + 2 + 0.8 =$  **5.6 m**  
 or  
 $200 + 80 + 200 + 80 =$  **560 cm** **A** must have correct units
- b)  $2 \times 0.8$  **1.6 m<sup>2</sup>**  
 or  
 $200 \times 80$  **16000 cm<sup>2</sup>** **A** must have correct units
- c) From b) area one side is 1.6 m<sup>2</sup>, so two sides is  $2 \times 1.6 = 3.2$  m<sup>2</sup>  
**Will cover** **A**  
 Working must be shown – answer only not acceptable.

## QUESTION THREE

- a) **105 km/hr** **A** need answer and units.  
 Accept 104–106 range  
 Accept units of: kph etc or in words. Ignore spelling.
- b) **7 mL** **A** need answer and units.  
 Can also have units of: ml, cc, cm<sup>3</sup>  
 Allow word form. Ignore spelling.

### QUESTION FOUR

- a) i)  $r = 4$       $A = \pi \times 4^2 =$      **50.265 m<sup>2</sup>**     **A**     needs units, accept any rounding
- ii)  $V = A \times d = \pi \times 4^2 \times 1.4 =$      **70.372 m<sup>3</sup>**     **M**     needs units, accept any rounding
- iii)  $V = 70.372 \text{ m}^3 \times 1000 = 70,372 \text{ L}$      **A**  
 $70,372 \text{ L} \div 25 = 2,814 \text{ minutes}$      **M**  
 $2,814 \div 60 =$      **46.9 hours**     **E**     accept minor rounding errors
- b) i)  $d = 12$       $C = \pi \times 12 =$      **37.699 m**     **A**     needs units, accept any rounding
- ii)  $A (\text{outer}) = \pi \times 6^2 = 113.097 \text{ m}^2$      **A**, but cannot get A here and Q4 a) i)  
 $A (\text{inner}) = \pi \times 4^2 = 50.265 \text{ m}^2$   
 $A = 113.097 - 50.265 =$      **62.83 m<sup>2</sup>**     **M**     needs units, accept any rounding

### QUESTION FIVE

- a) i)  $45 + 45 + 15 + 5 = 110 \text{ minutes}$   
 $110 \div 60 =$       **$1 \frac{5}{6} = 1.83 \text{ hours}$**      **M**     accept any rounding  
A for 1 hr, 50 min. No marks for 1.50 hours
- ii)  $2:30 + 1 \text{ h } 50 \text{ m} = 3 \text{ h } 80 \text{ m}$      **4:20 p.m.**     **A**     allow COE from i)
- b) i)  $21 \text{ h } 45 \text{ m} + 3 \text{ h } 20 \text{ m} = 24 \text{ h } 65 \text{ m} = 25 \text{ h } 5 \text{ m}$   
**01:05 on Friday**     **M**     or 0105, 0105h etc  
need a day for M, but accept "the next day" etc
- ii)  $01:05 - 2:00 = 23:05$      **11:05 p.m. Thurs**     **E**     allow M only for COE  
M for 23:05 or no day given

### QUESTION SIX

- a)  $\frac{1}{2} \times b \times h = \frac{1}{2} \times 8 \times 8 =$      **32 cm<sup>2</sup>**     **A**     need units
- b)  $V = A \times d = 32 \times 4 =$      **128 cm<sup>3</sup>**     **M**     A without units
- c)  $V(\text{carton}) = 24^3 = 13,842 \text{ cm}^3$       $V(\text{pack}) = 128 \text{ cm}^3$      Carton holds  $13842 \div 128 = 108 \text{ packs}$   
 $108 \times 80 = 8,640 \text{ g}$      **8.64 kg**     **E**     allow COE in volume from b)  
or  
Each carton holds  $24 \div 8 = 3$  high,  $24 \div 8 = 3$  wide, and  $24 \div 4 = 6$   
 $3 \times 3 \times 6 = 54$ , doubled because they are triangular prisms not cuboids = 108 packs  
 $108 \times 80 = 8,640 \text{ g}$      **8.64 kg**     **E**     M if forget to double for triangular

# Geometry

The boxes show the required number of questions for each grade level		
<b>Achieved</b>	<b>Merit</b>	<b>Excellence</b>
<b>6</b>	<b>4</b>	<b>2</b>

## QUESTION ONE

- $\angle X VW = 65^\circ$  Type **acute** **A** accept  $66^\circ$
- $\angle X V Z = 152^\circ$  Type **obtuse** **A**
- $\angle Y V Z = 105^\circ$  Type **obtuse** **A** accept  $104^\circ - 106^\circ$
- $\angle W V Z = 87^\circ$  Type **acute** **M**  $180 - 65 - 28$  accept any COE

## QUESTION TWO

“Reason” at Merit level is the name of the rule(s) used. They may be shortened , e.g. “line = 180”, abbreviated, e.g. “Vert. opp.”, or shown in symbolic form e.g. “ $\Delta s = 180$ ”

Reasons may be written on the diagram instead of in the spaces provided, but must have the name.

It is not acceptable to show merely the arithmetic from that rule, e.g. “ $180 - 140$ ” is not a “reason” except when calculating the interior angles of a polygon.

- a)  $A = 40^\circ$  Reason: **Angles on a line add 180°** **A**
- b)  $B = 51^\circ$  Reason: **Alternate angles are equal** **A**
- c)  $C = 50^\circ$  Reason: **Co-interior add to 180°** **A**
- $D = 130^\circ$  Reason: **Vertically opposite are equal** **A**
- d)  $E = 144^\circ$  Reason:  **$(10 - 2) \times 180 = 1440$**   **$1440 \div 10$**  **M** A without working
- e)  $F = 45^\circ$  **A** even if answer only  
 Reasons: **angles on a line add 180°**  
**angles in a triangle add 180°** **M** requires both reasons
- f)  $G = 260^\circ$  **A** even if answer only  
 Reasons: **base angles isosceles are equal**  
**angles in a triangle add 180°**  
**angles at a point add 360°** **M** requires all three reasons

### QUESTION THREE

“Reason” at Excellence level is the name of the rule(s) used at Merit level, plus the expectation that they are clearly written and given in a logical order.

If an explanation is missing, incorrectly labelled or the order is confused – but the basic process is correct – then M can be given.

Reasons may be shown on the diagrams, but there needs to be some indication of the order that they are used.

- a)  $H = 90^\circ$  A even if answer only  
Reasons: **interior angles octagon are  $(8 - 2) \div 8 = 135^\circ$**   
**angles at a point add  $360^\circ$**  E requires all three reasons

- b)  $J = 85^\circ$  A even if answer only  
Reasons:  **$a = 55^\circ$  angles on a line add to  $180^\circ$**   
 **$b = 30^\circ$  corresponding are equal**  
 **$c = 95^\circ$  angles in a triangle add to  $180^\circ$**   
 **$J = 85^\circ$  angles on a line add to  $180^\circ$**  E all steps must have reasons

There are many alternative solutions to this problem. This is merely the easiest. Other solutions include working via the top triangle or putting in a third parallel line through J.

### QUESTION FOUR

- Reasons:  **$\angle GFB = 130^\circ$  vertically opposite are equal**  
 **$\angle BFI = \angle GFB - \angle GFI = 60^\circ$**   
**we see that  $\angle BFI = \angle DIJ$**   
**Two corresponding angles are equal, therefore the lines are parallel**

There are alternative solutions to this problem. However, it is important that they cannot use the parallel line rules (alternative, corresponding, co-interior) until the very last step, because up to that point it is now known that the lines are parallel.