

MAN vs MATHS

Year 9 Mathematics Practice Exam #2 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 3×2 , 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:

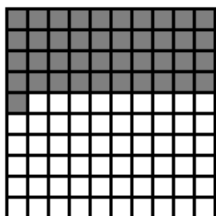
- For each section the required number of questions for each grade level is shown. The grade boundaries shown are **indications** only. The standard in the actual exam may be higher or lower.
- Higher grade answers may count down, but lower grades never count up.
7 "A" and 3 "M" answers has more than 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
12	4	2

QUESTION ONE



a) **A**

b) i) **0.41** **A**

ii) $\frac{41}{100}$ **A**

QUESTION TWO

a) $-6 < -5$

b) $7.2 > 7.15$ **A** if a) and b) both correct

c) $\frac{3}{5} = 0.6$

d) $\frac{1}{5} > \frac{1}{8}$ **A** if c) and d) both correct

e) $0.7 > 7\%$

f) $\frac{6}{15} = \frac{2}{5}$ **A** if e) and f) both correct

QUESTION THREE

a) i) $\frac{17}{6}$ **A**

ii) $\frac{9}{5}$ **A**

b) i) **4.75** **A**

ii) **0.092** **A**

MAN²⁰¹⁹
VS
MATHS

QUESTION FOUR

- a) $\frac{44}{100} \times 135$ or $0.44 \times 150 =$ **59.4** **A**
- b) $\frac{12.5}{100} \times 420 = 52.5$ $420 + 52.5$ or 1.125×420 **\$472.50** **M** A if no \$ sign and "472.5"
- c) $\frac{37}{230} = 0.165217$ $0.165217 \times 100(\%)$ **16.52%** **A** rounding to any d.p. but not "16%" or "17%" without working
- d) $\frac{55}{160} = 0.3333$ $0.33333 \times 100(\%)$ **33.3%** **M** or any rounding A if "33%" with no working

QUESTION FIVE

- a) **8** **A**
- b) **75** **A**

QUESTION SIX

Split \$120 fairly, so Samantha gets $\frac{1}{3} = \$40$ and Megan gets $\frac{2}{3} = \$80$.

That leaves him owing Samantha \$160 and Megan \$320 **A** for any correct ratio split
\$480 over 25 weeks is $480 \div 25 = \$19.2$ per week (split \$6.40 and \$12.80)

$\frac{19.2}{80} = 0.24$ $0.24 \times 100(\%)$ **24%** **M**
accept rounding **up** amount paid, but not down

QUESTION EIGHT

$160 \div 0.8 =$ **\$200** **E** No mark for \$54,450

QUESTION EIGHT

$\frac{2}{3} \times 50 = 33.33$ L $33.33 \div 7.8 = 4.273$ lots of 100 km

$4.273 \times 100 = 427$ km **No not enough** **E**

or in reverse

450 km requires $450 \div 100 = 4.5$ lots of 7.8 L $4.5 \times 7.8 = 35.1$ L are required

$\frac{2}{3} \times 50 = 33.33$ L in tank **No not enough** **E**

QUESTION NINE

87 min for 5 GB is $5 \div 87 = 0.05747$ GB/min

40% faster is $0.05747 \times 1.4 = 0.08046$ GB/min

$8.5 \div 0.08046 = 105.6$ minutes **106 min** **E**

MAN²⁰¹⁹
MATHS

Algebra and Graphs

The boxes show the required number of questions for each grade level		
Achieved	Merit	Excellence
12	9	5

QUESTION ONE

- a) $2 \times 6 + 8 =$ **20** **A**
- b) $6 - -5 =$ **11** **A**
- c) $(-5) \times (-5) =$ **25** **A**
- d) $6 \times (8 +-5) = 8 \times 3 =$ **24** **M** accept with no working

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) $x - 10 = 2$ **$x = 12$** **A**
+10 +10
- b) $20 = 5x$ **$x = 4$** **A**
÷5 ÷5
- c) $4n + 6 = 21$
-6 -6
 $4n = 15$ **$n = \frac{15}{4}$ or 3.75** **M**
÷4 ÷4
- d) $3 - 5x = 28$ *or* $3 - 5x = 28$ **$x = -5$** **M** A for $x = \frac{25}{-5}$, $x = \frac{-25}{5}$ etc
-3 -3 -28 +5x -28 +5x
 $-5x = 25$ **$-25 = 5x$**
÷-5 ÷-5 ÷5 ÷5
- e) $9(k + 2) = 7k$ *or* $9k + 18 = 7k$ **$k = -9$** **M**
-7k -18 -7k -18 -9k -9k
 $2k = -18$ **$18 = -2k$**
÷2 ÷2 ÷-2 ÷-2

QUESTION THREE

a) $6(n + 5) = 15$ or $6n + 30 = 15$ **M** accept x instead of n

b) $6(n + 5) = 15$

$$\begin{array}{r} 6n + 30 = 15 \\ -30 \quad -30 \end{array}$$

$$\begin{array}{r} 6n = -15 \\ \div 6 \quad \div 6 \end{array}$$

$$n = -2.5$$

E accept $\frac{-5}{2}$ etc

No marks are to be awarded for a correct solution that does not carry over an equation from part a), or that shows no working. In particular showing $6 \times (-2.5 + 5) = 15$ is not acceptable.

Allow **M** for correct equation, solved with working, but an arithmetic error at one stage.

QUESTION FOUR

a) $3W - 100 = W - 10$ or $3W + 10 = W + 100$ **M** accept use of x

b) $3W - 100 = W - 10$

$$\begin{array}{r} -W \quad +100 \quad -W \quad +100 \end{array}$$

$$\begin{array}{r} 2W = 90 \\ \div 2 \quad \div 2 \end{array}$$

$$W = 45$$

E allow COE

No marks are to be awarded for a correct solution that does not carry over an equation from part a) and has no working. In particular, showing $3 \times 45 - 100 = 45 - 10$ is not acceptable.

QUESTION FIVE

a) $4d$ **A** no alternatives

b) $20k + h$ **A** or $h + 20k$ – no other alternatives

c) $2x + 10y^2$ **A** or $10y^2 + 2x$ – no other alternatives

d) a^4 **A** no alternatives

e) $20x - 3 - 10x$ **A**

$$= 10x - 3$$

M or $10x + -3$ – no other alternatives

no mark if student continues and gives $10x - 3 = 7x$

QUESTION SIX

a) $\frac{1}{2}n$ **A** or $n \div 2$ or $\frac{n}{2}$ or $\frac{1}{2} \times n$ – no other alternatives

b) $2(n + 6)$ **M** or $2(6 + n)$ or $(6 + n) \times 2$ or $(n + 6) \times 2$
accept as expanded $2x + 12$ or $12 + 2x$

QUESTION SEVEN

- a) $3x$ **A** or $3 \times x$ or $x \times 3$ – no other alternatives
- b) $(8 + x) + 5 + (8 + x) + 5$
 $= 2x + 26$ **A** any order, brackets not required
M or $26 + 2x$ – no other alternatives
no mark if student continues and gives $2x + 26 = 28x$
- c) $5 \times (x + 8) - 3 \times x$
 $5x + 40 - 3x$
 $= 2x + 40$ **A** if $5(x + 8)$ at any point
M
E or $40 + 2x$ – no other alternatives

QUESTION EIGHT

- a) $5x - 10$ **A** no mark if continues and gives $5x - 10 = -5x$ etc
- b) $6n - 2n^2$ **A** no alternatives. No mark if student continues
- c) $5x + 10 - 3x + 15 =$
 $6n - 2n^2$ **A**
M no alternatives. No mark if student continues

QUESTION NINE

- a) $5(x + 5)$ **A** no alternatives. No mark if student continues
- b) $4(2x - 3)$ **M** no alternatives. No mark if student continues
- c) $b(7 + a)$ **A** or $p(p + 2)$ no other alternatives.
- d) $5x^2(1 + 3x)$ **E** no alternatives. No mark if student continues

QUESTION TEN

- A = $(-5, 3)$ **A** no alternatives, needs brackets
- B = $(4, -2)$ **A** no alternatives, needs brackets
- C = $(0, 7)$ **A** no alternatives, needs brackets

Ignore one failure to close brackets, but need opening ones

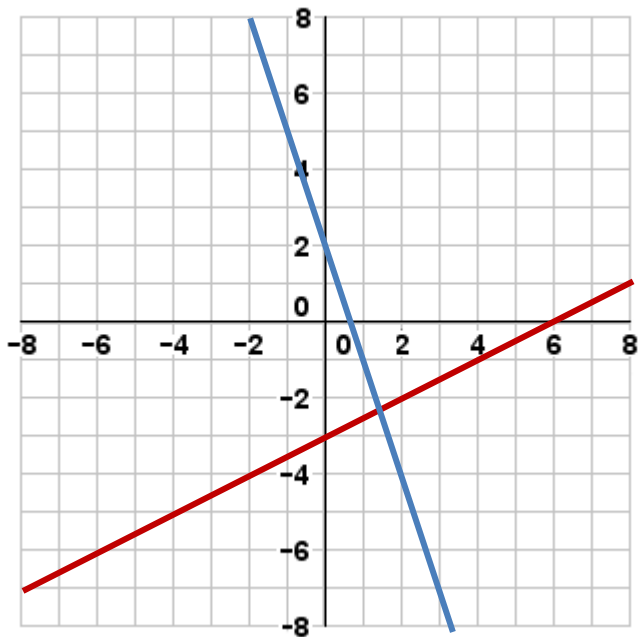
QUESTION ELEVEN

- a) **3** **A**
- b) **$\frac{1}{2}$** **M** or 0.5
- c) **$y = \frac{1}{2}x + 3$** **E** or $y = 0.5x + 1$ etc

QUESTION TWELVE

- $H = 2V - 2$** **M** or $H = 2 \times V + -2$ etc

QUESTION THIRTEEN



- a) **$y = -3x + 2$** **E**
- b) **line drawn as shown** **M** must cross $(0, -3)$ and $(6, 0)$ but may be shorter than shown

QUESTION FOURTEEN

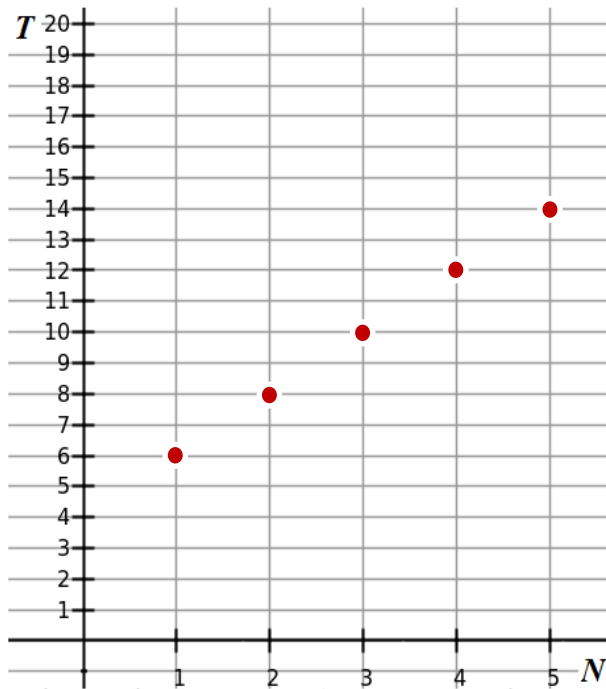
- a) **5 seconds** **A** accept "From 6 to 11 seconds"
- b) (Rise over run) $10 \div 6 =$ **A**
1.67 m/s **M** accept any rounding, ignore units

QUESTION FIFTEEN

a) see table below **A**

1	6
2	8
3	10
4	12
5	14

b)



As shown **M** do not deduct mark if line added

c) **$D = 2N + 4$** **E**

M for $y = 2x + 4$

d) $144 = 2N + 4$

$$140 = 2N$$

$N = 70$ **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
8	4	2

QUESTION ONE

- a) **45** km
- b) **750** mm **A** if a) and b) both correct
- c) **0.7** m³ **A**
- d) **135** seconds
- e) **44** minutes **A** if d) and e) both correct

QUESTION TWO

- a) $6 + 6.5 + 2.5 =$ **15 m** **A** must have correct units
- b) $\frac{1}{2} \times 6 \times 2.5 =$ **7.5 m²** **A** must have correct units
- c) $\frac{1}{2} \times 6 \times 2.5 \times 0.05 =$ **0.375 m³** **M** must have correct units

QUESTION THREE

- a) **70 kg** **A** need answer and units, accept 67–71 range
- b) **750 Watts** **A** need answer and units, allow "W" as units

QUESTION FOUR

- a) $r = 34 \div 2 = 17$
 $V = \pi \times 17^2 \times 18 =$ **16,343 cm²** **M** needs units, any rounding, accept 16.3 Litres
- b) $C = \pi \times 34 =$ **106.8 cm** **A** needs units, accept any rounding
- c) lid = $\pi \times 17^2 =$ 907.92 cm² **A**
 side = $\pi \times 34 \times 18 =$ 2,092.30 cm² **M**
 lid $\times 2 +$ side = **3,908.14 cm²** **E** needs units, accept any rounding at any stage

QUESTION FIVE

- a) i) **15:45** **A** or 0545, 0545h etc
- ii) **25 minutes** **A**
- iii) $25 \text{ min} = 25/60 = 0.41666 \text{ hours}$
 $3 \text{ km} \div 0.41666 \text{ hours} =$
7.2 km/hr **E** allow COE from ii), accept any rounding
- b) $9:30 + 8 \text{ hrs} = 17:30 = 5:30 \text{ next day}$ $5:30 + 0:45 = 6:15$
6:15 a.m. **M** or 06:15 etc
need a.m., "morning" etc
- c) $8 \text{ hrs} = 480 \text{ min}$ $480 \div 25 = 19.2$
19 deliveries **M** allow A if left as 19.2

QUESTION SIX

- a) i) $2.4 \div 0.6 = 4 \text{ wide}$, $2.7 \div 0.3 = 9 \text{ high}$, $5.9 \div 0.3 = 19.66 = 19 \text{ deep}$
 $4 \times 9 \times 19 =$ **684 cartons** **M**
- do not penalise if cartons 0.6 deep
 $2.4 \div 0.3 = 8 \text{ wide}$, $2.7 \div 0.3 = 9 \text{ high}$, $5.9 \div 0.6 = 9.83 = 9 \text{ deep}$
 $4 \times 9 \times 19 =$ **648 cartons** **M**
- if done by volume
 $b \times h \times d = 0.3 \times 0.3 \times 0.6 = 0.054 \text{ m}^3 \text{ for carton}$
 $b \times h \times d = 2.4 \times 2.7 \times 5.9 = 38.232 \text{ m}^3 \text{ for container}$
 $38,232 \div 0.054 =$ **708 cartons** **A**
- ii) $684 \times 16 = 10,944 \text{ kg}$ $10,944 \div 1,000$
10.9 tonnes **E** if M awarded in part i)
M if COE from part i)
- b) Each container has area $b \times h = 2.4 \times 5.9 = 14.16 \text{ m}^2$
 $120 \div 14.16 = 8.47$ **A**
9 containers **M** must round up

QUESTION SEVEN

- $60 \times 44 = 2,640 \text{ cm}^2$ for rectangle $\frac{1}{2} \times 3 \times 4 = 6 \text{ cm}^2$ for triangle
 $2,460 - 6 =$ **2,254 cm²** **M** needs units

Geometry

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

Achieved	Merit	Excellence
6	4	2

QUESTION ONE

- $\angle XVW = 65^\circ$ Type **acute** **A** accept 66°
- $\angle XVZ = 152^\circ$ Type **obtuse** **A**
- $\angle YVZ = 105^\circ$ Type **obtuse** **A** accept $104^\circ - 106^\circ$
- $\angle WVZ = 87^\circ$ 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 = **135°** Reason: **Vertically opposite are equal** **A**
- b) B = **30°** Reason: **Co-interior add to 180°** **A**
- c) C = **40°** Reason: **Angles on a line add to 180°** **A**
- D = **140°** Reason: **Corresponding angles are equal** **A**
- d) E = **45°** Reasons: **$(8 - 2) \times 180 = 1080$ $1080 \div 8 = 135$**
 angles on a line add to 180° **M** A without working
- e) F = **64°** Reasons: **vertical angles are equal** **M**
 Or Reasons **angles on a line add $180^\circ \times 2$** needs to be noted twice
- f) G = **35°** **A** even if answer only
 Reasons: **base angles isosceles are equal** **M**
 angles in a triangle add 180° needs both, either order

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.

Reasons: **A line F to C breaks the hexagon into 6 equal triangles, because regular**
 $\angle AOF = \angle EOF = 60^\circ$ because 360° divided into 6 equal parts
 $\triangle AOF$ and $\triangle EOF$ are isosceles, as $AO = FO = EO$ because regular
 $\triangle AOF$ and $\triangle EOF$ are equilateral, as base angles isosceles are equal
They share a side the same length, so all triangle lengths are the same
 $AO = OE = EF = AF$, so a rhombus **E** requires clear logic

There are many alternative solutions to this problem. This is merely the easiest. Due to the difficulty getting all the reasons exactly right, some leniency should be shown for the E grade.

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.