Year 10 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 ÷ 100 × 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".

  9 "M" and 2 "E" does not get Excellence in Number.

Number

The boxes show the required number of questions for each grade level		
Achieved	**Merit**	**Excellence**
6	**7**	**4**

QUESTION ONE

a) **68%** (0.68) **<** $\frac{32}{5}$ (6.4) **< 6.42 < 6.5** **A** reasons and conversions not required

b) **$-5\frac{1}{2}$** (−5.5) **< −5 < −4.6 < −4** **A** reasons and conversions not required

QUESTION TWO

a) **$75,000** **A**

b) $\frac{5}{17} \times 416000$ **$122,353 : $293,647** **M** Don't need $, accept any rounding

QUESTION THREE

$447,000 **A**

QUESTION FOUR

$\frac{27}{100} \times 43500 =$ **11,745** **A**

QUESTION FIVE

$\frac{5200}{43500} \times 435$ **11.95%** **A** rounding to any d.p. if working shown

QUESTION SIX

a) $\frac{4}{100} \times 43500 = 1740$ $43500 + 1740 =$

or 1.04×43500 **45,240** **M**

b) $43500 \div 0.97$ **44,845** **E**

QUESTION SEVEN

250000×1.05^8 **$369,363** **E**

QUESTION EIGHT

$^2/_9$ = 0.2222 originally $^3/_{11}$ = 0.2727 afterwards

an increase of 0.0505 from 0.2222, so $\frac{0.0505}{0.2222} \times 100$ **22.7%** **E**

QUESTION NINE

a) $\frac{12}{100} \times 12.50 = 1.5$ 12.5 – 1.5 =

or 0.88 × 12.5 = **$11** **M**

b) $\frac{0.5}{12.5} \times 100$ **4%** **M**

QUESTION TEN

0.74 × 34 = 25.16 trucks worth of work if used 100%

increasing the amount of work by a fifth, 1.2 × 25.16 = 30.192

but they can only be used at 80%, so 30.192 ÷ 0.8 = 37.74 = 38

which is an increase from 34 trucks of **4 more** **E**

QUESTION ELEVEN

a) In 40 hours they earn 40 × 22 = $880, so they need an extra $120

For overtime they earn 1.5 × 22 = $33 an hour

120 ÷ 33 = **4 hours** **E** allow 3.6 etc

b) To earn $1000 in 40 hours, they need to earn 1000 ÷ 40 = $25 an hour

25 is $\frac{3}{22} \times 100$ **13.6%** **M** A for "13%"

QUESTION TWELVE

DJ = 3 × 80 = 240 1.15 × 240 = $276 Decorations are 400 × 1.08 = 432

Fixed costs are $2000 + 1500 + 276 + 432 = $4208

3/5 × 162 = 97 plus 0.65 × 97 = 63, so 160 people approximately will go

4208 ÷ 160 = 26.3. Add in cost of dinner + 30 = **$56.30** **E** M if small mistake

QUESTION THIRTEEN

5.8M US ÷ 0.63 = 9.2M NZD Discount of 8% makes it 9.2 × 0.92 = $8.47M

Over 5 years = 60 months

8.47 ÷ 60 = (rounded) **$140,000 per month** **E**

M if small mistake

Algebra and Graphs

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

QUESTION ONE

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

b) **$4h$** **A** no alternatives

c) **$9x - 2xy$** **M** or $-2xy + 9x$ no other alternatives

d) **$3p^2$** **A** no alternatives

e) **$20x^5y$** **M** no alternatives

QUESTION TWO

a) **$8n - 6$** **A** accept if x used instead of n

b) **$4(n + 2)$** **M** or $(2 + n) \times 4$ or $4n + 8$ etc, with brackets or expanded

QUESTION THREE

a) $2 \times 4 \times 5 =$ **40** **A**

b) $(4 \times 4) - (-3) =$ **19** **A**

QUESTION FOUR

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) $x - 12 = 4$
$+12 \quad +12$
$x = 16$ **A**

b) $5x + 11 = 2$
$-11 \quad -11$
$5x = -9$
$\div 5 \quad \div 5$
$n = \frac{-9}{5}$ or -1.8 **A**

c) $21 = 3x - 15$
$+15 \quad +15$

$36 = 3x$ **$x = 12$** **A** accept $x = \frac{36}{3}$
$\div 3 \quad \div 3$

d) $2x + 24 = 6x + 13$
$-2x \quad -13 \quad -2x \quad -13$

$11 = 4x$ **$x = \frac{11}{4}$** or 2.75 **M** accept $x = \frac{-11}{-4}$
$\div 4 \quad \div 4$

e) $2x + 8 = 4x - 20$
$-2x \quad +20 \quad -2x \quad +20$

$28 = 2x$ **$x = 14$** **M**
$\div 2 \quad \div 2$

QUESTION FIVE

No marks are to be awarded for a solution that does not start with an equation or is not solved using algebra – such as showing the answer works by 7 + 7 + 8 = 22.

a) $c + h = 22$ We know $c = h + 8$ so $c + c + 8 = 22$

$2c + 8 = 22$
$-8 \quad -8$

$2c = 14$ **7** biscuits **M** answer must be clear

b) $30m + 25 = 400$
$-25 \quad -25$

$30m = 375$ **12.5** km **M** answer must be clear
$\div 30 \quad \div 30$

c) $\frac{x+6}{2} = \frac{x+16}{7}$

$7x + 42 = 2x + 32$
$-2x \quad -42 \quad -2x \quad +42$

$5x = -10$ The numbers is **−2** **E**

QUESTION SIX

a) T = 0.1(85000 – 40000) = **$4,500** **A**

b) 4800 = 0.1(E – 40000)

4800 = 0.1E – 4000
$+ 4000 \quad +4000$

8800 = 0.1E **$88,000** **A** allow answer only
$\div 0.1 \quad \div 0.1$

c) T = 0.1E – 4000 **$E = \frac{T + 4000}{0.1}$** **E** or equivalent

equivalents include: E = 10(T + 4000); E = 10T + 40,000 and $E = \frac{T}{0.1} + 40{,}000$

QUESTION SEVEN

a) **$3x - 15$** **A** no alternatives

b) **$2xy + 4x$** **A** or $2yx + 4x$ no other alternatives

c) **$5x^2 + 15x$** **A** no alternatives

d) $4x + 24 + 2x - 20$ A

$= 6x + 4$ **M** no mark if student continues and gives $6x + 4 = 10x$

e) $x^2 + 10x + 2x + 20$ A

$= x^2 + 12x + 20$ **M** any order

QUESTION EIGHT

a) **$10(x + 2)$** **A** no alternatives

b) **$x(x + 4)$** **A** no alternatives

c) **$2x(5 + x)$** **M** or $2x(x + 5)$ no other alternatives

d) **$(x + 5)(x + 3)$** **M** or $(x + 3)(x + 5)$ no other alternatives

e) **$(x + 1)(x - 13)$** **E** or $(x - 13)(x + 1)$ no other alternatives

QUESTION NINE

a) $\frac{a + a + 4}{2} \times 5$ A or equivalent

$\frac{2a + 4}{2} \times 5$

$\frac{10a + 20}{2}$ **$5a + 10$** **M**

b) $\frac{2a + 4}{2} \times 5 = 60$ or $5a + 10 = 60$ etc

$\frac{2a + 4}{2} = 12$ $5a = 50$

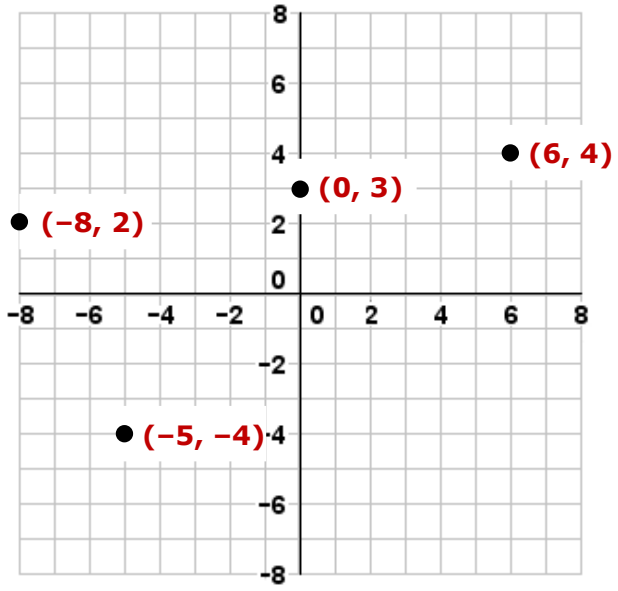
$2a + 4 = 24$

$2a = 20$ **10** **E** must be solved from an equation, but it need not be a simplified one

Patterns and Graphs

The boxes show the required number of questions for each grade level		
Achieved	**Merit**	**Excellence**
3	**4**	**4**

QUESTION ONE



A accept one minor error, must have brackets

QUESTION TWO

a) **10** **A**

b) **34** **A** no working required

c) **D = 3L − 2** **M** or equivalent

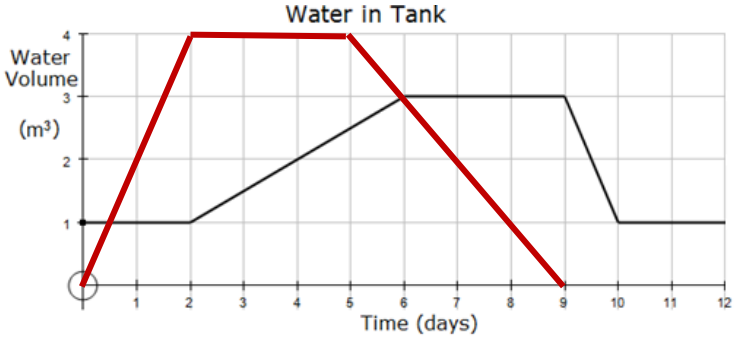
QUESTION THREE

a) **4 days** **A** accept without units

b) 2 m^3 in 4 days = **0.5 m^3/day** **M** accept without units

c) **y = −2x + 21** **E**
accept other variables e.g. W = −2d + 21

d) two of the lines shown A
all three solid lines shown **M**



QUESTION FOUR

a) **Eagle**, by **3 months** **A** accept without units

b) i) **Hawk**, from **8th to 9th months** **A**

ii) **40 m per month** **M** accept without units

c) by reading off the graph, after **about 4.6 months** **A** or if no reason given
At 30/month to get to 80, plus two months behind **4.666** **M**
80 = 30m – 60, and solving gives after **4.667 months** **E**

QUESTION FIVE

a) $y = 3x - 4$ **M** or $y = 2x + -5$ etc

b) $y = -2x + 4$ **M**

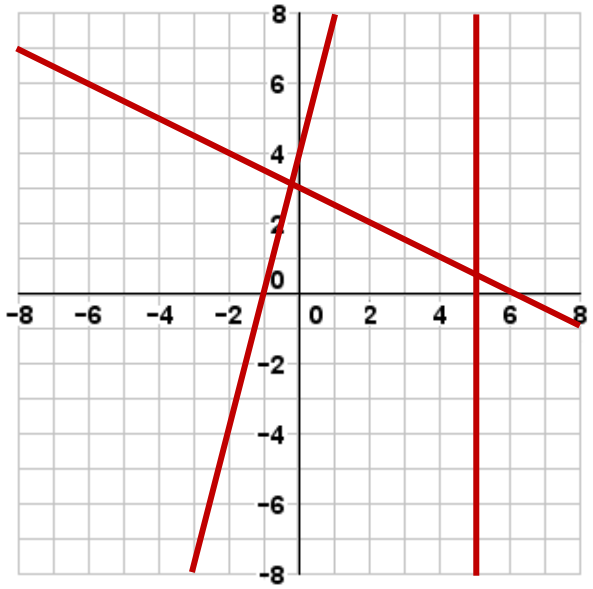
c) $y = ½\ x + 1$ **E** or $y = 0.5x + 1$ etc

QUESTION SIX

a) as shown **A**

b) as shown **M**

c) as shown **E**



Measurement

The boxes show the required number of questions for each grade level		
Achieved	**Merit**	**Excellence**
7	**4**	**2**

QUESTION ONE

a) **0.85** km

b) **2500** mL

A if a) and b) both correct

c) **12** hours

d) **108** hours

A if c) and d) both correct

QUESTION TWO

a) **tonnes** or **t**

A accept Mg or megagrams

b) **centimetres squared** or **cm²**

A

QUESTION THREE

a) $\pi \times 35 =$ **110 mm** **M** need answer and units.

b) $70 + 40 + 40 =$ **150 mm** **A** need answer and units.

c) $\frac{1}{2} \times 20 \times 70 =$ **700 mm²** **M** need answer and units.

QUESTION FOUR

a) **2:35 p.m.**

M need p.m.

a) **1315** or 13:15 or 1315 h

A do not allow 1315 p.m.

a) **140 minutes**

A need units

QUESTION FIVE

a) Outer radius is half 90 minus two, so outer circle area is $\pi \times 43^2 = 5809$ cm^2

Inner radius is half 60, so outer circle area is $\pi \times 30^2 = 2827$ cm^2

Cross section area is therefor 5809 – 2827 = 2982 cm^2

depth is 30 minus rubber on both sides = 28 cm

volume is 2982 × 28 = 83,496 cm^2

83496 ÷ 500 = **167 seconds** **E** accept any rounding, with working

M for minor error

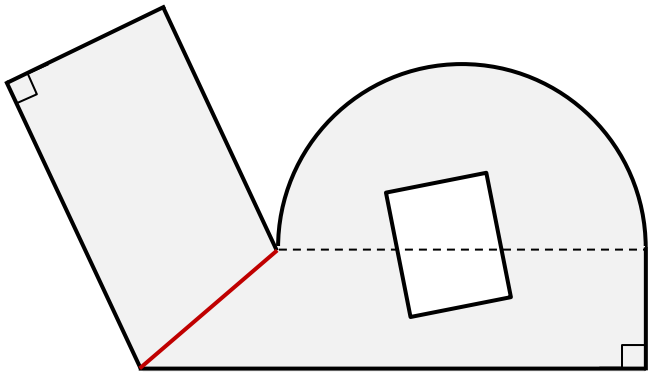
must have units

QUESTION SIX

a) $12 \times 4.8 \times 4.4 =$ **253.44 m^3** **M** need units

b) $\pi \times 1.9^2 \times 12.2 = 138.4$ m^3 **138,400 L** **E** allow any rounding

QUESTION SEVEN



The semicircle's area $= \pi \times 40^2 \div 2 = 2513$ m^2

The bottom trapezium = ½ (80 + 110) × 28 = 2660 m^2

The left trapezium = ½ (70 + 60) × 40 = 2600 m^2

The rectangle in the middle = 22 × 26 = 572

A for any of these correct

M if two shapes are correct

The total area is 2513 + 2660 + 2600 – 572 m^2

7201 m^2 **E**

need answer clearly stated with units

Trigonometry

The boxes show the required number of questions for each grade level		
Achieved	**Merit**	**Excellence**
6	**3**	**2**

QUESTION ONE

a) **0.643** **A** accept any rounding

a) **41.35°** **A** accept any rounding

a) **11.75** **A** accept any rounding

QUESTION TWO

$10^2 + 24^2 = 676$ $26^2 = 676$

$a^2 + b^2 = c^2$ so it must be a right angled triangle **A**

QUESTION THREE

a) $20^2 + 18^2 = 724$ $\sqrt{724}$ = **26.91** **A** accept any rounding with working

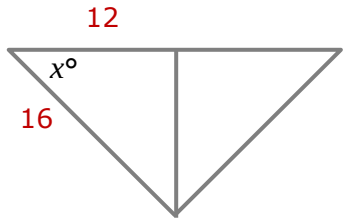
b) $360^2 - 270^2 = 56700$ $\sqrt{ans}$ = **238.1** **A** accept any rounding with working

c) $\sin(42) \times 15 =$ **10.04** **A** accept any rounding with working

QUESTION FOUR

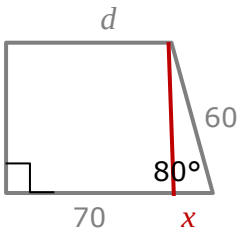
$\tan^{-1}(\frac{81}{55}) =$ **55.82°** **M** accept any rounding with working

QUESTION FIVE



$\cos^{-1}(\frac{12}{16}) =$ **41.41°** **M** accept any rounding with working

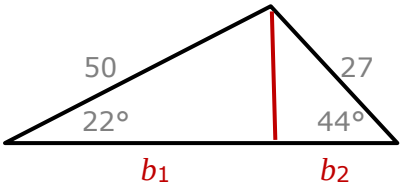
QUESTION SIX



x = cos(80) × 60 = 10.42

take that off from 70 gives **59.58** **M** accept any rounding with working

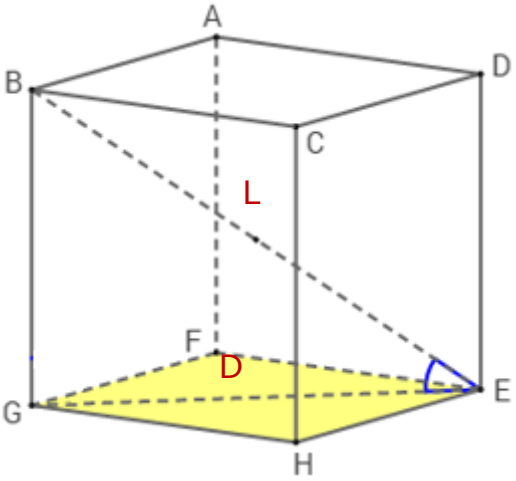
QUESTION SEVEN



$b = b_1 + b_2$ =

cos(22) × 50 + cos(44) × 27 = **65.78** **M** accept any rounding with working

QUESTION EIGHT



$D^2 = 10^2 + 10^2 = \sqrt{200} = 14.14$

The angle ∠EGB is a right angle, as this is a cube

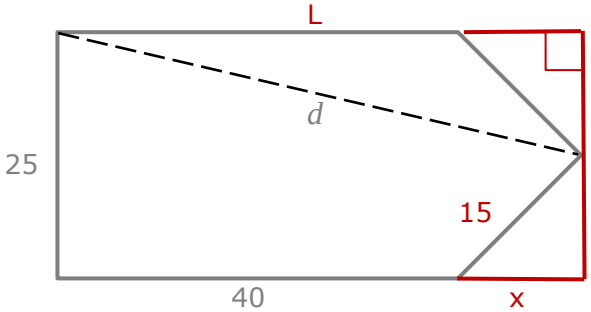
$L^2 = 10^2 + 14.14^2 = \sqrt{300} = 17.32$

$\theta = \cos^{-1}(14.14/17.32)$ =

35.26° **E** accept any rounding with working

QUESTION NINE

The pentagon has mirror symmetry.



$x^2 = 15^2 - 12.5^2$ d = 8.29

L = 40 + d = 48.29

$d^2 = 48.29^2 + 12.5^2 = 2488.3$ **49.88** **E** accept any rounding with working