Year 10 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 ÷ 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".

  8 "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**	**3**

QUESTION ONE

a) 6.42×10^4 **<** 6.085×10^5

b) 4.3×10^{-2} **>** 7×10^{-3}

c) $-4\frac{1}{2}$ **<** -3.5 **A** need all three

QUESTION TWO

a) **$600** **A**

b) **$504 : $336** **M** Don't need $ signs

QUESTION THREE

185 **A** Must be a whole number

QUESTION FOUR

14.3% **A** rounding to any d.p. but not "14%" without working

QUESTION FIVE

2.8 m **A** units not required

QUESTION SIX

a) $\frac{5}{100} \times 560000 = 28000$ $560000 + 28000$

or 1.05×560000 **$588,000** **M**

b) $560000 \div 1.07$ **$523,364** **E**

QUESTION SEVEN

$1.5 \times 10^{12} \div 3 \times 10^9$ **500** (sec) **M**

QUESTION EIGHT

a) 400 ÷ 80 × 100 = 500 g of silver

500 ÷ 6 **83** (badges) **M** A if not rounded

b) 35 ÷ $^{5}/_{8}$ = 56 badges

56 × 18 **$1,008** **M**

QUESTION NINE

$^{2}/_{3}$ of R = $^{1}/_{2}$ of E

2 of R = $^{3}/_{2}$ of E 4 of R = 3 of E **R : E = 3 : 4** **E**

M if not specified which is R and which E

QUESTION TEN

a) $\frac{20}{100}$ × 85 = 17 85 – 17 =

or 0.8 × 85 **$68** **M**

b) $\frac{20}{85}$ × 100 **23.5%** **M** A if rounded to 23%

QUESTION ELEVEN

$^{2}/_{5}$ – $^{1}/_{4}$ = $^{3}/_{20}$ difference in downloaded amount which is 2 minutes

if $^{3}/_{20}$ is 2 then one whole = $^{20}/_{20}$ is 2 × 20 ÷ 3 = $^{40}/_{3}$ minutes (13.3 minutes)

two-fifths downloaded, so three fifths still to go

$^{3}/_{5}$ of $^{40}/_{3}$ = $^{3}/_{5}$ × $^{40}/_{3}$= **8** (minutes) **E** M if 13.3 calculated

QUESTION TWELVE

Costs are $29.10 = 3 × 4.95 + 2 × 1.70 + 3.60 +2.35 + 4.90 (or $28.25 if 1.5 bags of flour)

The amount of blueberries allows you to make 1500 ÷ 200 = 7.5 lots of the recipe

which is 7.5 × 8 = 60 muffins. $150 profit + $29.1 costs = 179.10

179.1 ÷ 60 = 2.985 **$3 each** **E** M if small mistake

QUESTION THIRTEEN

He earns $60 × 30 × 48 = $86400

Splitting that into costs profit gives: $^{2}/_{7}$: $^{5}/_{7}$ = 24,686 : 61,714

removing GST 61714 ÷ 1.15 **$53,665** **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) $2 \times 3 \times -2 =$ **−12** **A**

b) $-2 + 3 =$ **1** **A**

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) $5 = x + 12$
$-12 \quad -12$
$x = -7$ **A**

b) $5x + 18 = 10$
$-18 \quad -18$
$5x = -8$
$\div 5 \quad \div 5$
$n = \frac{-8}{5}$ or −1.6 **A**

c) $16 = 4x + 8$
$-8 \quad -8$
$8 = 4x$
$\div 4 \quad \div 4$
$x = 2$ **A** accept $x = \frac{8}{4}$

d) $8x + 11 = 5x + 19$
$-5x \quad -11 \quad -5x \quad -11$
$3x = 8$
$\div 3 \quad \div 3$
$x = \frac{8}{3}$ or 2.66 **M** accept any rounding

e) $x + 6 = 3x + 12$
$-x \quad -12 \quad -x \quad -12$
$-6 = 2x$
$\div 2 \quad \div 2$
$x = -3$ **M**

QUESTION THREE

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 2 × (50 + 20) = 140.

a) **$8x = 36$** **etc**
÷8 ÷8

$x = 4.5$ **the sides are 4.5 long** **M** answer must be clear

b) $2(m + 20) = 140$

$2m + 40 = 140$
−40 −40

$2m = 140$ **He starts with \$50** **M** A if equation solved wrong
÷2 ÷2

c) $\frac{a+b+c}{3} = 50$ so $a + b + c = 150$ We know $a = c - 35$ and $a + 25 = b$

$a + b + c = a + (a + 25) + (a + 35) = 3a + 60 = 150$

$a = 30$ The numbers are **30, 55 and 65** **E**

QUESTION FOUR

a) W = 12 × 2 + 14 × 2 + 8 = **60** **A**

b) $87 = 12 \times n + 14 \times 1 + 13$

$87 = 12n + 27$
−27 −27

$60 = 12n$ $n = 5$ **5 Carbons** **A** allow answer only
÷12 ÷12

c) W = 12C + 14N + H

W − 12C − H = 14N **N =** $\frac{\mathbf{W - 12C - H}}{\mathbf{14}}$ **E** or equivalent

QUESTION FIVE

a) **$3d$** **A** no alternatives

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

c) **$8x^2 - 6x$** **M** or $-6x + 8x^2$ no other alternatives

d) **$15p$** **A** no alternatives

e) **$25x^6$** **M** no alternatives

QUESTION SIX

a)	**$20 + 4x$**	**A**	or $4x + 20$ no other alternatives
b)	**$5x^2 + 3x$**	**A**	no alternatives
c)	**$-2x^2 - 6x$**	**A**	or $-2x^2 + -6x$ no other alternatives
d)	$2x - 6 + 4x + 40$	A	
	$= 6x + 34$	**M**	no mark if student continues and gives $6x + 34 = 40x$
e)	$x^2 + 4x + 5x + 20$	A	
	$= x^2 + 9x + 20$	**M**	any order

QUESTION SEVEN

a)	**$4(x + 5)$**	**A**	no alternatives
b)	**$a(a + b)$**	**A**	no alternatives
c)	**$5x(2x + 3)$**	**M**	no alternatives
d)	**$(x + 5)(x + 10)$**	**M**	or $(x + 10)(x + 5)$ no other alternatives
e)	**$(x + 11)(x - 6)$**	**E**	or $(x - 6)(x + 11)$ no other alternatives

QUESTION EIGHT

a)	**$6n + 10$**	**A**	accept if x used instead of n
b)	**$\frac{1}{2}(n + 15)$**	**M**	or $(n + 15) \div 2$ or $\frac{n + 15}{2}$ etc, but must have brackets

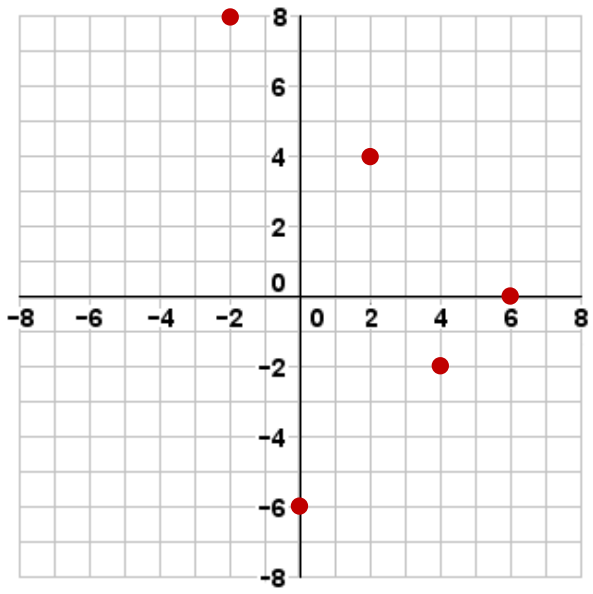
QUESTION NINE

a)	$h + h + 2 + h + h + 2$	A	or equivalent
	$= 4h + 4$	**M**	
b)	$4h + 4 = 161$		
	$4h = 157$		
	$h = 157/4$		
	the height is 39.25 cm	**E**	accept $\frac{157}{4}$, must be solved from equation

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

QUESTION TWO

a) **31** **A**

b) **C = 3L + 1** **M**

QUESTION THREE

a) **40 Litres** **A** accept without units

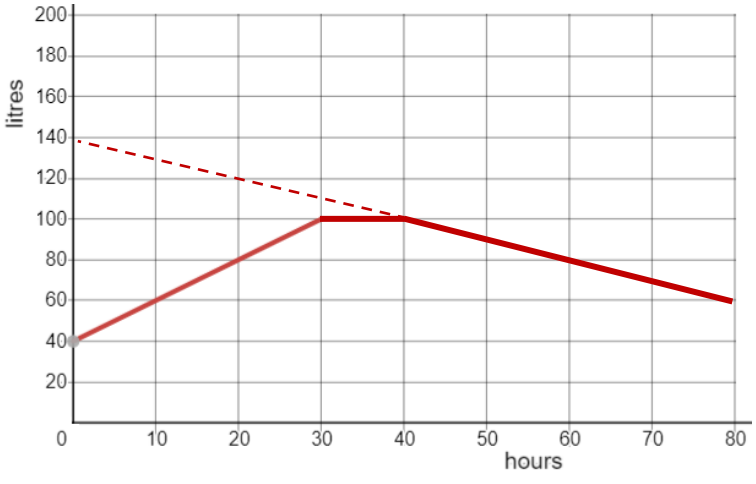
b) 60 L in 30 hours = **2 L/hr** **M** accept without units

c) one line shown A

both solid lines shown **M**

d) **y = −1x + 140** **E**

or equivalent,
accept other variables
e.g. **L = −1h + 140**



QUESTION FOUR

a) **At 10 weeks** **A** accept without units

b) **The lines have a constant gradient** **M** accept "lines are straight" etc

c) by reading off the graph **$100,** **A** or if no reason given
Starts with 400 and is spending $20 per week **M**
$ = 400 – 20w, and putting in W = 15 gives **$100** **E**

d) **That would mean he has negative money in the bank** **E** or equivalent

QUESTION FIVE

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

b) $y = -3x + 2$ **M**

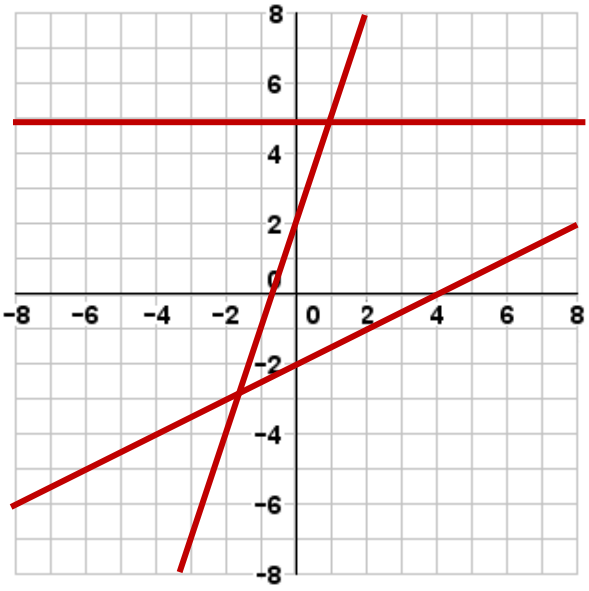
c) $y = -\frac{1}{4}x + 2$ **E** or $y = -0.25x + 2$ etc

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**
8	**3**	**3**

QUESTION ONE

a) **3200** m

b) **0.075** g — **A** if a) and b) both correct

c) **4.5** or **4½** min

d) **150** min — **A** if c) and d) both correct

QUESTION TWO

a) **kilograms** or **kg** — **A**

b) **metres** or **m** — **A**

QUESTION THREE

a) ½ × 40 × 48 = **960 cm²** — **A** need answer and units.

b) $\pi \times 12.5^2 \times 3 =$ **1472.6 mm³** — **E** need answer and units.

QUESTION FOUR

a) **1305** or 13:05 or 1305 h — **A** do not accept 1305 pm

b) **1 hour 20 minutes** or 80 minutes — **A** need units

c) **3:20 p.m.** or 15:20 — **M** need p.m. or 24 hour time

QUESTION FIVE

a) i) Trapezium = ½ × (a + b) × h

½ (2 + 1.8) × 1.6 = 3.04 m²

3.04 × 3.2 depth= **9.728 m³** — **E** accept any rounding, with working must have units

QUESTION SIX

a) $50 \times 120 =$ **6,000 cm²** **A** need units

b) $\pi \times 50^2 \div 8 =$ **981.7 cm³** **M** accept any rounding, with working must have units

c) 50 cm across base = 50 cm
two straight sides, each 120 = 240 cm
½ circumference = $\pi \times 100 \div 2$ = 157.1 cm
adding them up **447.1** **E** give M for one error

QUESTION SEVEN

The outer ring of the logo is 77 mm wide, so will be 7.7 metres wide, so has a radius of 3.85m
The ring is 10 mm wide, so the radius is 1 m less, so the inside has a radius of 2.85m
The area of the ring is: $\pi \times 3.85^2 - \pi \times 2.85^2 = 21.04$ m²

Each inside circle has a diameter of 24 mm, so 2.4 metres, which means a radius of 1.2 m
The area of the four inside circles is: $\pi \times 1.2^2 \times 4 = 18.10$ m²

The total area is 21 + 18 = 39 m², but we need two colours, so 19.5 m² of each

$19.5 \div 4.5 = 4.33$

5 tins of each colour are needed **E** need answer clearly stated
M for one minor error

Trigonometry

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

QUESTION ONE

a) **0.839** **A** accept any rounding

a) **17.46°** **A** accept any rounding

a) **64.62°** **A** accept any rounding

QUESTION TWO

$15^2 + 12^2 = 369$ $20^2 = 400$

$a^2 + b^2 = c^2$ for a right angled triangle **A**

QUESTION THREE

a) $36^2 - 27^2 = 567$ $\sqrt{568}$ = **23.81** **A** accept any rounding with working

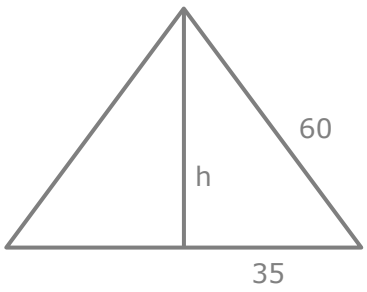
b) $\sin(50) \times 36$ = **27.58** **A** accept any rounding with working

c) $12 \div \tan(32)$ = **19.20** **M** accept any rounding with working

QUESTION FOUR

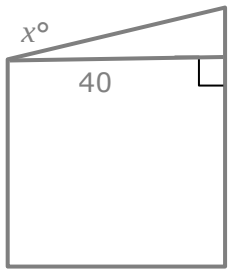
$\cos^{-1}(\frac{55}{100})$ = **56.63°** **M** accept any rounding with working

QUESTION FIVE



$60^2 - 35^2 = 2375$ $\sqrt{2375}$ = **48.73** **M** accept any rounding with working

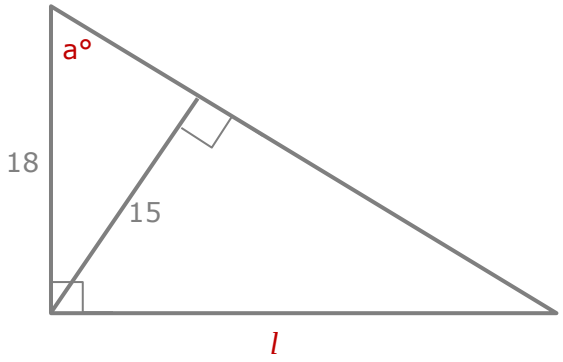
QUESTION SIX



20 (=70 – 50)

$\tan^{-1}(\frac{20}{40})$ = 26.57° add on 90° **116.57°** **M** accept any rounding with working

QUESTION SEVEN



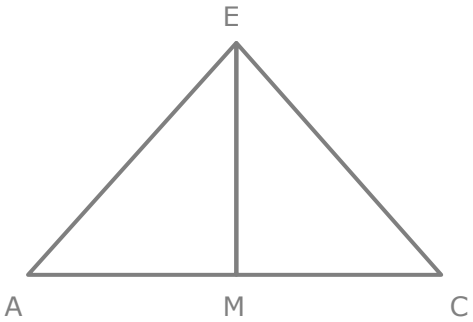
a° = $\sin^{-1}(\frac{15}{18})$ = 56.44°

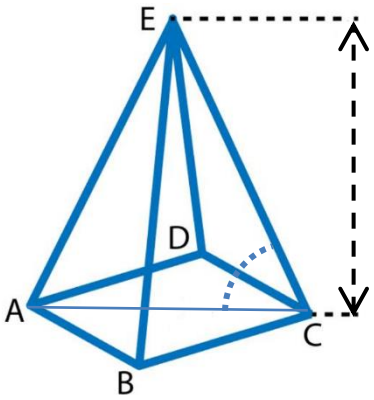
l = tan(56.44°) × 18

27.14 **E** accept any rounding with working

QUESTION EIGHT

By symmetry, AEC is an isosceles triangle.





The distance AC is $\sqrt{(12^2 + 12^2)}$ = 16.97

Distance AM is half AC, so 8.485

Distance EM is the height, so 30

$\angle$ ECM = $\tan^{-1}(\frac{30}{8.495})$ **74.2°** **E** accept any rounding with working