

FORM 4 END OF TERM 2 EXAM

MATHEMATICS

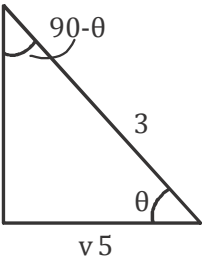
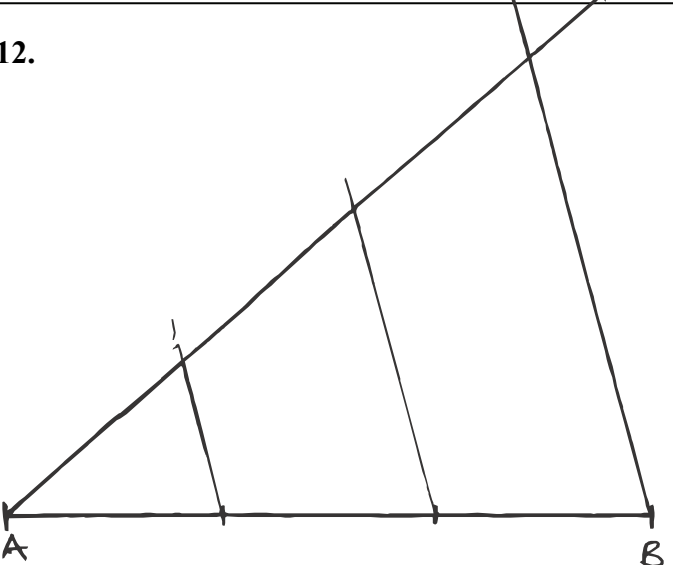
Paper 1

July 2018

MARKING SCHEME

<u>SECTION I</u>		
<p>1. $\frac{36 - 8x - 4 + 5}{3x - 3 + -8(6 + 2)}$</p> <p>$= \frac{36 + 32 + 5}{-9 + -8(8)}$</p> <p>$= \frac{73}{-73}$</p> <p>$= -1$</p>	M1	✓ numerator
	M1	✓ denominator
	A1	
	3	
<p>2. $3x^2 + 6xy - xy - 2y^2$</p> <p>$= 3x(x + 2y) - y(x + 2y)$</p> <p>$(3x - y)(x + 2y)$</p> <p>$(y - 3x)(y + 3x)$</p> <p>$\frac{(3x - y)(x + 2y)}{-(3x - y)(y + 3x)}$</p> <p>$= \frac{x + 2y}{-(y + 3x)}$</p>	M1	numerator
	M1	denominator
	A1	
	3	
<p>3. $2^{6(x+1)} + 2^{3(2x)} = 1040$</p> <p>$2^{6x+6} + 2^{6x} = 1040$</p> <p>let $2^{6x} = y$</p> <p>$64y + y = 1040$</p> <p>$y = 16$</p> <p>$2^{6x} = 16 = 2^4$</p> <p>$6x = 4$</p> <p>$x = \frac{2}{3}$</p>	M1	expression
	A1	
	M1	equation
	A1	
	4	

<p>4. $-2 \begin{bmatrix} 5 - x \\ 5 - y \end{bmatrix} = \begin{bmatrix} 8 - x \\ 7 - y \end{bmatrix}$</p> <p>$2x - 10 = 8 - x$ $3x = 18 \quad x = 6$ $2y - 10 = 7 - y$ $3y = 17$ $y = \frac{17}{3}$ $c(6, \frac{17}{3})$ or $c(6, 3\frac{2}{3})$</p>	<p>M1</p> <p>A1 B1</p> <p>3</p>	<p>equations</p>
<p>5. $\frac{9}{8}x \times \frac{7}{6}x \times 32 = 42$ men</p> <p>$42 - 32 = 10$ men</p>	<p>M1</p> <p>M1A1</p> <p>3</p>	
<p>6. L.S.F = $\frac{3}{5}$</p> <p>A.S.F = $\frac{9}{25}$</p> <p>Area of trapezium = $25 - 9$</p> <p>Ratio = $9 : 16$</p>	<p>B1</p> <p>B1 B1 B1</p> <p>4</p>	
<p>7. $L_1 \quad x \geq 0$</p> <p>$L_2 \quad \frac{0 - 4}{5 - 0} = \frac{-4}{5}$</p> <p>$\frac{y - 0}{x - 5} = \frac{-4}{5}$ $5y = -4x + 20$ $y = \frac{-4x + 20}{5}$</p> <p>$L_3 \quad A(0, 3) \quad B(4, 0)$ $\frac{-3 - 0}{0 - 4} = \frac{3}{4}$ $4y = 3x - 12$ $y = \frac{3x - 12}{4}$ $y > \frac{3x - 12}{4}$</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>3</p>	
<p>8. $100 + 140 + 125 + 105 + 4x + x = 720^\circ$</p> <p>$470 + 5x = 720$ $5x = 250$ $x = 50^\circ$</p> <p>Fifth angle = $4x = 200^\circ$</p>	<p>M1</p> <p>A1</p> <p>B1 3</p>	

<p>9.</p>  $\sqrt{3^2 - 2^2} = \sqrt{5}$ <p>a) $\tan \theta = \frac{2}{\sqrt{5}}$</p> <p>b) $\cos (90 - \theta) = \frac{2}{3}$</p>	<p>B1 B1</p> <p>B1 3</p>	<p>90 - q or $\frac{2}{\sqrt{5}}\sqrt{5} = \frac{2\sqrt{5}}{5}$</p>
<p>10. $7000 \times 100.80 = \text{sh.}705600$ $705600 - 332790 = \text{sh.}372810$</p> $\frac{372810}{146.20} = \text{£}2550$	<p>B1 M1</p> <p>A1 3</p>	
<p>11. a) $\frac{8-x}{6-x} = \frac{3}{1}$ $8-x = 18-3x$ $x = 5$</p>	<p>M1</p> <p>A1 2</p>	
<p>b) (5, 5) (10, 15)</p> $\frac{15-5}{10-5} = \frac{10}{5} = 2$ $m = 2$ $\frac{y-5}{x-5} = 2$ $y-5 = 2x-10$ $y = 2x-10+5$ $y = 2x-5$	<p>M1</p> <p>A1 2</p>	
<p>12.</p> 	<p>B2</p>	

<p>17. a) Area of hemispherical part $= \frac{1}{2} \times 4\pi r^2$ $= 2 \times \frac{22}{7} \times 35 \times 35$ $= 7700\text{cm}^3$</p> <p>b) Slant height for original cone $\frac{1}{l-60} = \frac{35}{14}$</p> <p>$L = 100$ surface area $\pi RL = \pi rl$ $= \frac{22}{7} \times 35 \times 100 - \frac{22}{7} \times 14 \times 40$ $= 11000 - 1760$ $= 9240\text{cm}^2$</p> <p>c) Total surface area $7700 + 9240 + \frac{22}{7} \times 14^2$ $= 7700 + 9240 + 616$ $= 17556\text{cm}^2$</p>	<p>M1 A1</p> <p>M1 A1</p> <p>M1 M1 A1</p> <p>M1 A1</p> <p>10</p>	<p>✓ equation</p> <p>✓ expressions</p>
<p>18. a) i) $\vec{AB} = \vec{AO} + \vec{OB}$ $= -\vec{a} + \vec{b}$</p> <p>ii) $\vec{AM} = \vec{AO} + \vec{OM}$ $= -\vec{a} + \frac{1}{4}\vec{b}$</p> <p>iii) $\vec{QN} = \vec{OQ} + \vec{QN}$ $= \vec{a} + \frac{1}{3}(-\vec{a} + \vec{b})$ $= \frac{2}{3}\vec{a} + \frac{1}{3}\vec{b}$</p> <p>b) $\vec{QX} = h\vec{QN}$ $\vec{QX} = \vec{OQ} + \vec{QX}$ $= h(\frac{2}{3}\vec{a} + \frac{1}{3}\vec{b})$ $= \vec{OQ} + k\vec{AM}$ $= \frac{2}{3}h\vec{a} + \frac{1}{3}h\vec{b}$ $= \vec{a} + k(-\vec{a} + \frac{1}{4}\vec{b})$ $= \vec{a} - k\vec{a} + \frac{1}{4}k\vec{b}$ $= \vec{a}(1-k) + \frac{1}{4}k\vec{b}$</p> <p>$\frac{2}{3}h\vec{a} + \frac{1}{3}h\vec{b} = \vec{a}(1-k) + \frac{1}{4}k\vec{b}$ $\frac{2}{3}h\vec{a} = (1-k)\vec{a} \Rightarrow \frac{2}{3}h = 1-k$ (i) $k = \frac{2}{3}$ } $\frac{1}{3}h\vec{b} = \frac{1}{4}k\vec{b} \Rightarrow \frac{1}{3}h = \frac{1}{4}k$ (ii) $h = \frac{1}{2}$ }</p> <p>c) $\vec{AX} = k\vec{AM} \Rightarrow \vec{AX} = \frac{2}{3}\vec{AM}$ A is common</p>	<p>B1</p> <p>B1</p> <p>M1 A1</p> <p>M1 M1</p> <p>B1 B1</p> <p>B1 B1</p> <p>10</p>	<p>✓ expression</p> <p>✓ expression</p> <p>✓ equations with OX</p>

19. a)

Class	i	f/d	x	f
11-20	10	1.2	15.5	12
21-25	5	2.6	23	13
26-40	15	1.4	33	21
41-50	10	2.2	45.5	22
51-55	5	1.2	53	6

b) 22

c)

f	x - a	f(x - a)
12	-17.5	-210
13	-10	-310
21	0	0
22	12.5	275
6	20	120
74		55

$$\begin{aligned} \bar{x} &= a + \frac{\sum (x - a)}{\sum f} \\ &= 33 + \frac{55}{74} \\ &= 33.7432 \end{aligned}$$

B1 ✓ class

B1 ✓ fd

B1 ✓ x

B1 ✓ f

B1 ✓ frequency

B1 ✓ x - a

B1 ✓ f(x - a)

B1 ✓ totals

M1

A1

10

20. a) C.P of mixture

$$25 \times 5 + 30 \times 2 + 45 \times 1 = 230/=$$

$$\text{S.P} = \frac{120}{100} \times 230$$

$$= 276/=$$

$$\text{profit per kilogram} = \frac{276 - 230}{8}$$

$$= 5.76$$

b) C.P after 1 year $\frac{112}{100} \times 230$

$$= 257.60$$

$$\text{profit} = \frac{120}{100} \times 257.60$$

$$= 309.12$$

$$\text{price per kg of mixture} = \frac{309.12}{8}$$

$$= 38.64$$

ii) $40.25 - 32.2 = \text{sh.}8.05$

$$\% \text{ profit} = \frac{8.05}{32.2} \times 100 = 25\%$$

B1

B1

M1

A1

M1

A1

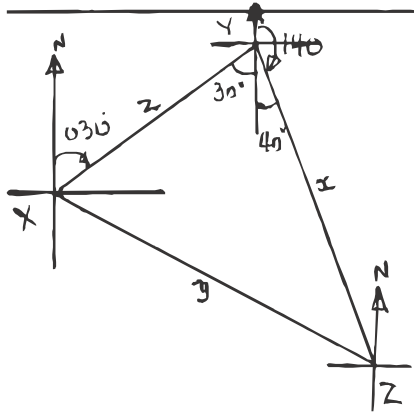
M1

A1

M1A1

10

21.



$$\begin{aligned}
 y^2 &= x^2 + z^2 - 2xz \cos 70^\circ \\
 &= 750^2 + 500^2 - 750000 \cos 70^\circ \\
 &= 812500 - 256.52 \\
 &= 555984.89 \\
 y &= 745.64\text{km}
 \end{aligned}$$

$$\begin{aligned}
 \text{c) } \frac{\sin \theta}{500} &= \frac{\sin 70^\circ}{745.64} \\
 \theta &= 39.06^\circ
 \end{aligned}$$

$$\begin{aligned}
 \text{bearing } &360 - (39.06 + 40) \\
 &= 280.94^\circ
 \end{aligned}$$

$$\begin{aligned}
 \text{d) } \cos 20^\circ &= \frac{a}{500} \\
 a &= 500 \times 0.9397 \\
 &= 469.85\text{km}
 \end{aligned}$$

$$\begin{aligned}
 \text{e) } b^2 &= 900^2 + 750^2 - 2 \times 750 \times 900 \cos 50^\circ \\
 &= 504736.73^\circ \\
 b &= 710.45\text{km}
 \end{aligned}$$

B1

✓ diagram

M1

A1

M1

✓ equation

A1

B1

✓ bearing

M1

✓ expression

A1

M1

A1

10

<p>22. a) $a = \frac{v - u}{t}$ $2^{3/4} = \frac{22 - 0}{t}$ $t = 22 \div 2^{3/4}$ $= 8 \text{ seconds}$</p> <p>b) distance = area under the curve $= \frac{1}{2} \times 8 \times 22$ $= 88\text{m}$</p> <p>c) Total distance covered before deceleration $88 + (32 \times 22)$ $= 792\text{m}$ Distance remaining $847 - 792$ $= 55\text{m}$ Distance = time x speed $55 = (t \times 22) \times \frac{1}{2}$ $55 = 11t$ $5 = t$ Retardation $\frac{v - u}{t}$ $= \frac{0 - 22}{5}$ $= 4.4\text{m/s}^2$</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>10</p>	<p></p> <p></p> <p></p> <p></p> <p>✓ distance</p> <p>✓ distance</p> <p></p> <p></p> <p></p> <p></p> <p></p>
<hr/>		
<p>23. On graph</p> <p>24. a) $L_1 : \frac{y - 2}{x + 1} = \frac{-1}{2}$ $2y - 4 = -x - 1$ $2y - 4 = -x - 1$ $y = -\frac{1}{2}x + \frac{3}{2}$</p> <p>b) $L_2 : m = \frac{6 - -3}{4 - 2} \Rightarrow \frac{9}{2}$ $\frac{y - 6}{x - 4} = \frac{9}{2}$ $2y - 12 = 9x - 36$ $2y = 9x - 24$ $y = \frac{9}{2}x - 12$</p> <p>c) $-\frac{1}{2}x + \frac{3}{2} = \frac{9}{2}x - 12$ $-5x = -13\frac{1}{2}$ $x = \frac{27}{2} \times \frac{1}{5}$ $= \frac{27}{10}, y = \frac{3}{20}$ point of intersection $(\frac{27}{10}, \frac{3}{20})$</p> <p>d) $\frac{y - 6}{x - 4} = \frac{-1}{2}$ $2y - 12 = -x + 4$ $2y = -x + 16$ $y = -\frac{1}{2}x + 8$</p>	<p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>✓ equation</p> <p></p> <p></p> <p></p> <p>✓ expression</p> <p></p> <p>✓ equation</p>

e) gradient of L_2 $\frac{9}{2}$
new gradient $-\frac{2}{9}$

$$\frac{y - -2}{x - -2} = \frac{-2}{9}$$

$$9y + 18 = -2x - 4$$

$$9y = -2x - 22$$

$$y = -\frac{2}{9}x - \frac{22}{9}$$

M1

✓ equation

A1

