

# COUNTDOWN TO YOUR FINAL MATHS EXAM ... PART 6 (2017)

## EXAMINERS REPORT & MARKSCHEME

## Examiner's Report

**Q1.** No Examiner's Report available for this question

**Q2.** Pie charts remain a poorly answered question. Many errors were seen here, such as in totalling the frequencies, calculating the angles, and accuracy in drawing the angles. There were also many guesses seen when it came to drawing angles suggesting that protractors were not always being used by candidates with too many pie charts in which there were more than four sectors.

**Q3.** There is clear evidence that many candidates attempting this question were doing so without the aid of a protractor. Drawing angles of 40, 56, 24 resulted in four sectors, which did not appear to bother some candidates. The majority drew a pie chart with three sectors that only approximated to the proportions of the number of students in each category.

Part (b) was also poorly answered, with too many answers referring to the sizes of the sectors or angles, rather than focussing on the actual number of students (which we did not know). Although most tried to justify a reason for "no", there were equally some acceptable justifications for an answer of "yes".

**Q4.** No Examiner's Report available for this question

**Q5.** In part (a), many candidates made hard work of finding 50% of 86, ignoring the fact that 50% is equal to  $\frac{1}{2}$ .

In part (b), failure to take BIDMAS (bodmas) into consideration often left candidates with the most common error of 16 for their answer.

Estimating the square root of 60, in part (c), proved difficult for many candidates; 6 and 8 were common answers approaching the required answer, which did allow a range from 7.1 to 7.9. Many tried to square 60; halving 60 to give 30 was also common.

**Q6.** No Examiner's Report available for this question

**Q7.** Many candidates could not see the connection between the statement and the information in the bar chart. A common erroneous response was that 'There were 15 in Coolkat so it could not be 1 of out 6' Of those that realised the statement was about a proportion, most could give a sensible reason why it was true. Only a few said 'No' followed by 'It's 15 out of 90'.

There were many good answers to the pie chart with well drawn and fully labelled diagrams. Some candidates clearly did not have a protractor (or ruler) but could calculate the angles correctly. Of the candidates who were successful, most carried their calculations from the original total of 90 from the bar chart. A few started from measuring the Katkins sectors and then working out the others proportionately.

**Q8.** In part (a) students could either convert to percentages to make the comparison, or find 10% of 360° for a comparison to be made. Both methods were equally popular, though the latter more successful. Some had difficulty in converting to a percentage from a fraction (e.g.  $\frac{40}{360}$  or  $\frac{1}{9}$ ). In part (b) many realised that they had to first find the missing angle for those who cycled, and this was presented in working, on the diagram, or frequently as their final answer. Only a minority went on to use this to calculate the number of students who cycled.

**Q9.** About half the candidates correctly provided the fraction of the total number of pencils in the box that were red. The most common error was to recognise that the angle for red was 90° and give this as their final answer. Candidates struggled to write down an expression, in terms of  $x$ , for the angle used for yellow. There were a few correct responses.  $x^2$  and  $x = 2y$  were commonly seen which did not score. Others used their own variable such as  $G$  rather than  $x$  which meant they could not score in part (b). Candidates struggled to find the correct answer to part (c). There were many incorrect methods seen.

**Q10.** This question was generally well answered.

In part (a), the vast majority of candidates were able to add the two numbers correctly. In part (b), the vast majority of candidates were able to subtract the two numbers correctly. Common incorrect answers were 133 and 277. In part (c), the vast majority of candidates were able to multiply the three numbers correctly. A common incorrect answer was 25 (usually from  $2 \times 3 = 5$ ,  $5 \times 5 = 25$ ).

**Q11.** Essential to gaining any marks in this question was some understanding of staged charges: a first charge added to a charge per unit, sometimes referred to as a standing charge per unit cost. Preparation for this type of question is important, and those students who were familiar with this charging structure gained many, if not all of the marks in this question. It was most common to find students stating the charge correctly for Quick Mix. For Speedy Hire some worked out  $7.20 \times 4$  (instead of  $\times 5$ ) though usually included the delivery cost. As long as there was some sensible working out shown, examiners could give credit for a sound conclusion based on their working, but a random guess without support gained no marks.

**Q12.** This question was not done well with most candidates gaining either 3 marks or 0 marks. Few candidates realised that they needed to use the  $100^\circ$  given in the pie chart to calculate the amount raised in Year 7. Most candidates only used the numbers in the table. A common incorrect answer here was (£)193.75. Although not penalised, candidates should be advised to take greater care with the use of money notation. Answers such as £137.5, 137.50 and 137.5, were very common.

**Q13.** Candidates often struggle with bearings and this year was no exception with candidates being unsure of which angle to measure. Part (b) was tackled well with most candidates measuring at least one of the distances correctly in cm and then converting this correctly to km scoring at least 2 marks. Many then went on to produce a final answer between 7 and 9 from correctly measuring all 3 distances.

**Q14.** Throughout this question, students appeared more confident with scale drawing than with bearings. In part (a) where a bearing was measured only about 40% gave the correct  $120^\circ$  with some answers of  $60^\circ$  blank responses indicated that some may not have been equipped with a protractor.

The vast majority of students picked up some marks on parts (b) and (c) but the main issue was one of accuracy. In part (b) the distance on the map had to be measured to within 2mm but many students were 3 mm away from the correct value.

Similarly, students who appeared to know what to do in part (c) lost one or even both marks due to a lack of care with their actual drawing. Again, students need to be aware that the tolerances allowed here were  $\pm 2\text{mm}$  and  $\pm 2^\circ$

**Q15.** No Examiner's Report available for this question

**Q16.** No Examiner's Report available for this question

**Q17.** As expected, a wide variety of methods was employed for this question, some to great effect, others less so. The decimal point caused a problem for many candidates trying to employ a grid method, often ending up with 1, 80,  $3 \times 40$ , 7. Those who chose to ignore the decimal point and reinsert it at the end were significantly more successful. The grid methods proved popular and were carried out by many reasonably well. Candidates who used repeated addition often either incurred too many errors or seemingly lost sight of what they were doing, and so scored nothing. With the 'traditional' method, a number of errors came from answers in the wrong columns or confusion over which number to put down/carry forward. Most candidates remembered to 'leave a gap' or 'add the zero'.

The candidates who made no more than one multiplication error were largely successful at placing the decimal point and thus many scored two of the available marks. The most common multiplication error was  $7 \times 8$ .

Some candidates treated this as an estimation question. Whilst an estimation might aid candidates to see if the answer achieved was sensible, it was not an estimation question.

**Q18.** No Examiner's Report available for this question

**Q19.** Part (a) was usually correctly answered well with students showing a sound understanding of Pythagoras. A few did try to find an angle first and then work out the distance from the tree to the tower. In part (b), many students were able to correctly find the size of one of the angles but the understanding of bearings was poor. Some students insisted on finding an angle using either, or in some cases both, the sine or cosine rules. Often this led to inaccuracies, as a result of premature approximations. A significant number of students simply measured the angle with a protractor ignoring the fact that the diagram was not drawn to scale.

**Q20.** Students were most successful in part (a) and almost all were able to measure the distance between the bench and the fountain to gain the mark. Weaker students forgot to multiply their measurement by 2.

In part (b), students usually either gained the full 2 marks or 0, as those that did not understand bearings rarely drew anything on the diagram. There were however, a few that had drawn in the bearing then incorrectly measured the angle leading to an answer in the 70s.

Students attempted part (c) well and often, even if not worthy of any marks, were still using compasses to draw arcs. Many gained full marks or two marks having shaded the wrong region. Only the very weakest students were shading a square or irregular shaped region, though even these regions were shaded in-between the fountain and the bench, indicating some understanding of the problem even if they scored 0 marks.

**Q21.** No Examiner's Report available for this question

**Q22.** Addition of directed numbers caused relatively few problems in part (a) but when subtracting in part (b) some did give 9 as an answer to  $-5 - 4$  presumably from a misconception along the lines of "2 negatives make a positive".

In part (c) an answer of 3 was the most common error with the negative sign being completely ignored. In other cases, the division symbol was read as subtraction leading to an answer of  $-8$

## Mark Scheme

### Q1.

Paper 1MA1: 1F			
Question	Working	Answer	Notes
(a)		5	B1
(b)		Correct pie chart with labels	C1 For apples shown as 'half' ie 180° on pie chart  C1 All angles calculated correctly (Angles of 180°, 80°, 100°) or pie chart with correct angles C1 Fully correct pie chart with labels of apple, pear and plum

### Q2.

Question	Working	Answer	Mark	Notes
	360 ÷ 60 Apple = 18 × 6 = 108 Banana = 23 × 6 = 138 Orange = 9 × 6 = 54 Pear = 10 × 6 = 60	108, 138, 54, 60	4	M1 for evidence of method for at least one angle (could be implied by one correct angle on pie chart or working or in table) A2 for all angles drawn correctly (±2°) (A1 for at least one angle drawn correctly or all angles correct in the table) B1 for sectors labelled with fruit names (dependent on at least one angle drawn correctly and exactly 4 sectors)

### Q3.

Question	Working	Answer	Mark	Notes
(a)	construction = 120° hairdressing = 168° tourism = 72°	120° 168° 72°	3	M1 for correct working to find an angle (could be implied by one angle drawn correctly on the pie chart. A1 all three angles drawn ±2° B1 (dep on M1) correct labels NB: stating the angles is not labels
(b)		explanation	1	B1 ft reason given eg NO and "we don't know the actual figures", "there could be less Y10 students", or refers to the fact that the totals for the pie charts (or the sample groups) could be different NB: YES could also be justified.

### Q4.

Question	Working	Answer	Mark type	AO	Notes
		£458.85 or £454.86	P	3.1d	P1 for a correct process to find number of sachets used in a year, e.g. $5 \times 365 (= 1825)$ or $5 \times 366 (= 1830)$
			P	3.1d	P1 for a correct process to find the number of packs required, e.g. " $1825 \div 16 (= 114 \text{ or } 115)$ " or " $1830 \div 16 (= 114 \text{ or } 115)$ "
			P	3.1d	P1 for recognising the need to round up or down to ensure a whole number value $\text{£}3.99 \times 115$ (or 114)
			A	1.3b	A1 for £458.85 or £454.86

**Q5.**

Question	Working	Answer	Mark	Notes
(a)		43	1	B1 cao
(b)	3 + 10	13	1	B1 cao
(c)		7.1 – 7.9 inc.	1	B1 for answer in the range 7.1 – 7.9 inc

**Q6.**

Question	Working	Answer	Notes
(a)		Banana	B1 cao
(b)		20	B1 cao
(c)		explanation	C2 for full explanation, eg table shows exactly $\frac{1}{2}$ ; pie chart shows less than $\frac{1}{2}$ as angle is less than $180^\circ$ (C1 for partial explanation or reference to just pie chart or just table)

**Q7.**

Question	Working	Answer	Mark	Notes
(a)		Yes with valid reason	1	C1 for Yes with it can be cancelled to 1 in 6 oe, eg 15 out of 90 is the same as 1 out of 6 or $90 \div 6 = 15$ or No with as this survey <u>only</u> has 90 cats oe
(b)	Top Cat = $35 \times 4 = 140^\circ$ Katkins = $30 \times 4 = 120^\circ$ Coolkat = $15 \times 4 = 60^\circ$	Pie chart	3	or Can't tell with we do not know how many cats in the survey  M1 for $360 \div 90$ or 4 seen or one angle (TC or Ka or Co) correct in pie chart $\pm 2^\circ$ ignore labels, or one correct angle calculated A1 for any two angles (TC or Ka or Co) correct in pie chart. $\pm 2^\circ$ ignore labels A1 for fully correct and labelled pie chart. All angles $\pm 2^\circ$

**Q8.**

Paper_5MB1F_01				
Question	Working	Answer	Mark	Notes
(a)		No and comparison	2	M1 for writing a fraction of 360 eg $\frac{40}{360}$ or $\frac{36}{360}$  OR $\frac{1}{9}$ or $\frac{1}{10}$ or decimals 0.11 or 0.1 or percentages 11.1% or 10% (% needed) A1 for No and $\frac{40}{360} > \frac{36}{360}$ oe
(b)		75	3	OR $\frac{10}{100}$ M1 for $\frac{10}{100} \times 360 (= 36)$ A1 for No with 36  M1 for $360 - (70 + 40 + 150) (= 100)$ M1 for $150 \div ("100" \div 50)$ oe A1 cao

Q9.

PAPER: 5MB1F_01				
Question	Working	Answer	Mark	Notes
(a)		$\frac{1}{4}$	1	B1 for $\frac{1}{4}$ oe
(b)		$2x^\circ$	1	B1 for $2x^\circ$ oe (condone omission of $^\circ$ )
(c)		20	2	M1 for $150 \div 360 \times 48$ oe or $48 \div 4 + \frac{2}{3} \times (48 \div 4)$ oe A1 cao

Q10.

	Working	Answer	Mark	Notes
(a)		65	1	B1 cao
(b)		127	1	B1 cao
(c)		30	1	B1 cao

Q11.

Paper_5MB1F_01				
Question	Working	Answer	Mark	Notes
*		Quick Mix from correct working	4	M1 for $13.50 + 4 \times 6.90 (= 41.1)$ M1 for $7.20 \times (4 + 1) + 5.90 (= 41.9)$ A1 for 41.1(0) and 41.9(0) if working seen C1 ft (dep on M1) for a statement of Quick Mix with amounts clearly associated with correct companies

Q12.

Question	Working	Answer	Mark	Notes
	$900 \div 360$ $2.5 \times 100$  $900 - 250 - 225 - 125$ $- 162.50$	£250, £137.50	3	M1 for $(900-360) \times 100$ or $(100-360) \times 900$ oe or $(55-360) \times 900$ oe or implied by one correct value A1 for (£)250 or (£)137.5(0) seen A1 for (£)250 and (£)137.5(0) in correct positions

Q13.

PAPER: 5MB3F_01				
Question	Working	Answer	Mark	Notes
(a)		145	1	B1 accept 143 – 147
(b)		7 – 9	4	M1 for carrying out a correct measurement of one of the lines eg (AC as) 10.3 – 10.7 or (BC as) 7.8 – 8.2 or (AB as) 6.3 – 6.7 M1 for scaling at any stage (by $\times 2$ ) M1 for complete process of lengths AC – (AB + BC) ; scaled or unscaled A1 for answer in range 7 – 9

Q14.

Paper: 5MB3F_01				
Question	Working	Answer	Mark	Notes
(a)		118 - 122	1	B1 for 118 – 122
(b)		17.5	2	M1 for $2.5 \times "7"$ where "7" is 6.8 – 7.2 A1 for 17 - 18
(c)		Position marked	2	B1 for school marked due North of church B1 for distance of 6cm

**Q15.**

Paper 1MA1: 2H			
Question	Working	Answer	Notes
		135	B1 for identifying the angle of $70^\circ$ (on the diagram), showing understanding of notation P1 for process to find an angle in triangle $ABC$ , eg. for process to find angle $BAC$ , eg. $(180 - 50) \div 2$ ( $= 65^\circ$ ) A1 for 135

**Q16.**

Paper 1MA1:3F			
Question	Working	Answer	Notes
		5.25	B1 cao

**Q17.**

	Working	Answer	Mark	Notes																																
	$\begin{array}{r} 183 \\ \times 47 \\ \hline 1281 \\ 7320 \\ \hline 8601 \end{array}$ <table border="1" style="margin: 10px 0;"> <tr><td></td><td>1</td><td>8</td><td>3</td><td>×</td></tr> <tr><td></td><td>4</td><td>3</td><td>1</td><td>4</td></tr> <tr><td>8</td><td>7</td><td>5</td><td>2</td><td>7</td></tr> <tr><td></td><td>6</td><td>0</td><td>1</td><td></td></tr> </table> <table border="1" style="margin: 10px 0;"> <tr><td>100</td><td>80</td><td>3</td><td></td></tr> <tr><td>4000</td><td>3200</td><td>120</td><td>40</td></tr> <tr><td>700</td><td>560</td><td>21</td><td>7</td></tr> </table> $4000 + 3200 + 120 + 700 + 560 + 21 = 8601$		1	8	3	×		4	3	1	4	8	7	5	2	7		6	0	1		100	80	3		4000	3200	120	40	700	560	21	7	86.01	3	M1 for a complete method to multiply 183 by 47 (condone one multiplication error) A1 for digits 8601 given as the answer B1 (dep on M1) for correctly writing their answer to 2 decimal places
	1	8	3	×																																
	4	3	1	4																																
8	7	5	2	7																																
	6	0	1																																	
100	80	3																																		
4000	3200	120	40																																	
700	560	21	7																																	

**Q18.**

Question	Working	Answer	Mark type	AO	Notes
(a) (i)		Correct drawing	M	1.3a	M1 for a correct bearing drawn or for a correct distance drawn or quoted
(a) (ii)		230°	A	1.3a	A1 for a correct position of $B$
			B	1.1	B1 for $230^\circ$ cao
(b)		Correct statement with evidence	P	2.3a	P1 for drawing a correct right-angle triangle showing line East from $A$ and perpendicular from $B$ (can be implied by correct trigonometric ratio)
			M	1.3b	M1 for $\cos 50^\circ = \frac{d}{36}$ oe
			P C	2.2 2.1a	P1 for $36 \times \cos 50^\circ$ oe C1 for deduction 23.14 km plus a statement saying that the ship is always more than 23 km from the lighthouse

**Q19.**

Paper: 5MB3H_01				
Question	Working	Answer	Mark	Notes
(a)		5.0	3	M1 for $2.1^2 + 4.5^2$ or $4.41 + 20.25$ or 24.66 M1 for $\sqrt{(2.1^2 + 4.5^2)}$ or $\sqrt{24.66}$ A1 for answer in the range 4.9 to 5.0
(b)		115	4	M1 for a correct method to find the angle at the tower ( $A$ ) or the angle at the tree ( $B$ ), eg. $\tan(A) = \frac{4.5}{2.1} (= 2.14\dots)$ or $\tan(B) = \frac{2.1}{4.5} (= 0.46\dots)$ M1 for $\tan^{-1}\left(\frac{4.5}{2.1}\right) (= 64.98\dots)$ or $\tan^{-1}\left(\frac{2.1}{4.5}\right) (= 25.01\dots)$ A1 for 64.9(8...) or 25.0(1...) A1 for 115 or ft 180 - "64.98..." or 90 + "25.01"

**Q20.**

PAPER: 5MB3F_01				
Question	Working	Answer	Mark	Notes
(a)		15.2 – 15.6	1	B1 for 15.2 – 15.6
(b)		107 – 111	2	M1 for correct bearing clearly identified on diagram A1 for 107 – 111
(c)		Region shaded	3	B1 for circle centre f, radius 3.5cm B1 for circle centre b, radius 6cm B1 for correct region shaded

**Q21.**

Paper 1MA1: 1F			
Question	Working	Answer	Notes
		7.50	M1 60 ÷ 8  A1 accept 7.5

**Q22.**

Paper: 5MB3F_01				
Question	Working	Answer	Mark	Notes
(a)		2	1	B1 for 2 (or +2)
(b)		-9	1	B1 cao
(c)		-3	1	B1 cao