Countdown to your final Maths exam …
Higher Tier only … Part 3 (2020)
Examiners Reports & Markscheme

Examiners Reports

Q1. In part (a) many candidates did not know the meaning of the word 'reciprocal'. A variety of incorrect answers were seen with the most common being 25.

Part (b) was poorly answered. The most common incorrect answers were −9 and 0.03. Some candidates with the right idea failed to evaluate 3−2 and gave the answer as

In part (c) Many candidates were able to gain one mark for evaluating $9\times10^4 \times 3 \times 10^3$ as 270 000 000 or as 27×10^7. The difficulty for many was changing their answer to standard form. Many thought 27×10^7 was in standard form and failed to do the final step. Candidates who first converted the numbers in the question to ordinary numbers often ended up with too many or too few zeros. Some evaluated 9×3 incorrectly.

Q2. In part (a) of this question approximately 10% of candidates could express $5\sqrt{27}$ as $15\sqrt{3}$, with a further 10% of candidates making some progress in breaking down to $\sqrt{9\times3}$, $\sqrt{9}\sqrt{3}$ or .

In part (b) about one quarter of candidates knew that multiplying both the numerator and the denominator by $\sqrt{3}$ (or a multiple of $\sqrt{3}$) was the key to rationalising the denominator and most of these candidates were successful in expressing $\frac{21}{\sqrt{27}}$ as $7\sqrt{3}$ or an acceptable equivalent. A common error seen was multiplication of only the denominator by . Other candidates progressed as far as = , only to conclude their argument with "5 + $\frac{21\sqrt{3}}{3}$ = $8\sqrt{3}$ ".

Q3. Very few students attempted to convert the three terms to a common base in this question preferring to use their calculators in an attempt to find the value of 2^x. Of those students that did, many then failed to apply the index laws correctly. Others tried to apply the index laws without converting to a common base. It was not unusual to see $2^x = 2.73.....$ but few were able to complete the solution to find $x = 1.45$.

Some did by a trial and improvement approach and some by applying logarithmic skills (outside this specification but still a valid method). A number of students misinterpreted the values in the question as mixed numbers and converted them into improper fractions.

Q4. Many candidates had little or no understanding of surds. In part (a) those who multiplied the numerator and denominator by $\sqrt{5}$ scored one mark and many went on to give their answer as $15\frac{\sqrt{5}}{5}$ and scored the second mark. Some candidates attempted to simplify $15\frac{\sqrt{5}}{5}$, but these attempts were not always successful.

In part (b) relatively few candidates multiplied out the brackets to give four correct terms connected by addition signs. Some made careless errors, e.g. 1×1 = 2 and $\sqrt{3}\times\sqrt{3} = 9$. Most of the candidates who simplified the four terms to $4 + 2\sqrt{3}$ were able to identify the value of *a* and the value of *b* although some gave the value of *b* as $2\sqrt{3}$. A common error was for the expansion of the brackets to result in only two terms, 1×1 and $\sqrt{3} \times \sqrt{3}$

Q5 Part (a) was well attempted but as many candidates scored B1 as scored B0. Common errors included rewriting the value in the question or writing 0.01.

Part (b) was well attempted but few gained M1A1. Those that gained M1 usually earned the mark for $\sqrt[3]{27} = 3$. Other common errors included 27 ÷ 3 × 2 or writing $\frac{1}{\sqrt[3]{27}}$, $\frac{1}{\sqrt{27}}$ or $\frac{1}{\sqrt[3]{27^2}}$. Part (c) was well attempted by most candidates but few achieved full marks. Many split 75 correctly as 25×3 but did not write the square root sign or often wrote $25\sqrt{3}$ so achieved M0A0. A few candidates split 75 as 15 × 5.

Q6. This question was not done well. Few candidates could correctly write down the length of one side of the square, and many of those that could were unable to deal correctly with the subsequent calculations, often simplifying $\sqrt{120} \div 4$ to $\sqrt{30}$.

Q7. Not many students were able to score marks on this question. Those that did tended to score one or two marks generally for getting three or four terms correct when substituting into a^2 and b^2 and expanding. However, these students then struggled to subtract the two expressions and use $\sqrt{8} = 2\sqrt{2}$

Markscheme

Q1

PAPER: 1MA0_1H					
Question		Working	Answer	Mark	Notes
	(a)		$\frac{1}{5}$	1	B1 oe
	(b)		$\frac{1}{9}$	1	B1 cao
	(c)	$9\times10^4\times3\times10^3$	2.7×10^8	2	M1 27×10^7 oe or $9\times3\times10^{4+3}$ A1 cao

Q2

Question	Working	Answer	Mark	Notes
(a)	$5\sqrt{9\times3}$	$15\sqrt{3}$	2	M1 for sight of $\sqrt{9\times3}$ or $\sqrt{9}\ \sqrt{3}$ or $3\sqrt{3}$ A1 for $15\sqrt{3}$ (accept n = 15)
(b)		$7\sqrt{3}$	2	M1 for $\frac{21\sqrt{3}}{\sqrt{3}\sqrt{3}}$ A1 for $7\sqrt{3}$ (accept $\frac{21\sqrt{3}}{3}$)

Q3

Question	Working	Answer	Mark	Notes
		1.45	P1 P1 A1 P1 A2	for converting to a common base with at least one correct conversion, eg. (16 =) 2^4 or (8 =) 2^3 (dep) for correct use of index laws to derive an equation, eg. $4 \times \frac{1}{5} + x = 3 \times \frac{3}{4}$ oe for 1.45 oe (accept $2^{1.45}$) OR for a process to find the value of 2^x, eg. $8^{\frac{3}{4}} \div 16^{\frac{1}{5}} =$ 2.73… for 1.45 oe (accept $2^{1.45}$)

Q4

Question		Working	Answer	Mark	Notes
	(a)	$\frac{15}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$	$3\sqrt{5}$	2	M1 for $\frac{15}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$ A1 for $\frac{15\sqrt{5}}{5}$ or better
	(b)	$(1 + \sqrt{3})(1 + \sqrt{3})$ $= 1 + \sqrt{3} + \sqrt{3} + 3$ $= 4 + 2\sqrt{3}$	4,2	2	M1 for $1\times1 + 1\times\sqrt{3} + 1\times\sqrt{3} + \sqrt{3}\times\sqrt{3}$ oe A1 cao

Q5

		Working	Answer	Mark	Notes
	(a)		$\frac{1}{10}$	1	B1 for 0.1 or $\frac{1}{10}$ oe
	(b)		9	2	M1 for $(\sqrt[3]{27})^2$ or $\sqrt[3]{27}^2$ oe or $\sqrt[3]{27} = 3$ A1 cao
	(c)	$\sqrt{75} = \sqrt{25}\sqrt{3}$	$5\sqrt{3}$	2	M1 for $\sqrt{25\times3}$ or $\sqrt{25}\sqrt{3}$ oe A1 cao

Q6

PAPER: 5MB2H 01

Question		Working	Answer	Mark	Notes
			7.5	3	B1 for length given as $\frac{\sqrt{120}}{4}$ oe M1 for squaring $\frac{\sqrt{120}}{4}$ or $\frac{120}{4\times4}$ oe A1 for $\frac{120}{16}$ oe or $7\frac{1}{2}$ or 7.5 oe SC B1 for $\sqrt{30} \times \sqrt{30}$

Q7

Question	Working	Answer	Mark	Notes
		$16\sqrt{2}$	4	M1 for method to expand $(\sqrt{8} + 2)^2$ with at least 3 correct terms out of 4 terms M1 for method to expand $(\sqrt{8} - 2)^2$ with at least 3 correct terms out of 4 terms M1 (dep on M2) for a method to subtract the two expressions and use of $\sqrt{8} = 2\sqrt{2}$ A1 cao OR M1 for factorising $a^2 - b^2 = (a + b)(a - b)$ M1 for substituting for a and b with simplification (at least 1 of the two terms correct) M1 (dep on M2) for multiplying the 2 terms together and use of $\sqrt{8} = 2\sqrt{2}$ A1 cao