

**AUSTRALIAN MATHEMATICS COMPETITION
WARM-UP PAPER
SENIOR 8**

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Questions 1 - 4, 3 marks each

1. If $9^{3-x} = 81^{4-2x}$, then x equals

- (A) $\frac{5}{3}$ (B) $\frac{7}{6}$ (C) $\frac{11}{3}$ (D) $\frac{10}{7}$ (E) $-\frac{5}{3}$

2. If $p = q\left(r - \frac{1}{s}\right)$, then s equals

- (A) $\frac{p}{q} - r$ (B) $\frac{q}{qr - p}$ (C) $\frac{q}{p - qr}$
(D) $\frac{q}{r - p}$ (E) $\frac{1}{qr - p}$

3. Given $f(x) = |x| - x$, then the coordinates of the midpoint of the line joining the points $(f(2), f(-2))$ and $(f(4), f(-4))$ are

- (A) (0,0) (B) (0,6) (C) (3,6) (D) (0,4) (E) (0,3)

4. In a test all questions were of equal value. If you answered 9 of the first 10 questions correctly, but only $\frac{3}{10}$ of the remaining questions correctly, you would have scored 50% for the whole test. The number of questions in the test was

- (A) 60 (B) 40 (C) 20 (D) 50 (E) 30

Questions 5 - 8, 4 marks each

5. The diagram shows a 5 by 5 table. The top row contains the symbols P , Q , R , S and T . The fourth row contains the symbols P , Q and R at the centre. The remaining squares can be filled with P 's, Q 's, R 's, S 's and T 's such that no row, column or diagonal contains the same symbol more than once. The symbol that must go into the shaded square is

P	Q	R	S	T
	P	Q	R	

- (A) P (B) Q (C) R (D) S (E) T

6. If $a^2 = a + 2$, then a^3 equals

- (A) $a + 4$ (B) $2a + 8$ (C) $3a + 2$ (D) $4a + 8$ (E) $27a + 8$

7. A floor tile has the shape of a regular polygon. If the tile is removed from the floor and rotated through 50° it will fit back exactly into its original place in the floor. The least number of sides that the polygon can have is

- (A) 8 (B) 24 (C) 25 (D) 30 (E) 36

8. One of the Roman dice in the British Museum has 6 square faces and 8 triangular faces. It is twice as likely to land on any given square face as any given triangular face. What is the probability that the face it lands on is triangular, when thrown?

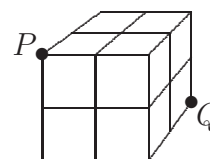
- (A) $\frac{4}{7}$ (B) $\frac{3}{11}$ (C) $\frac{3}{7}$ (D) $\frac{3}{10}$ (E) $\frac{2}{5}$

Questions 9 - 10, 5 marks each

9. On my car, a particular brand of tyre lasts 40 000 kilometres on a front wheel or 60 000 kilometres on a rear wheel. By interchanging the front and rear tyres, the greatest distance, in kilometres, I can get from a set of four of these tyres is

- (A) 52 000 (B) 50 000 (C) 48 000 (D) 40 000 (E) 44 000

10. Each face of a solid cube is divided into four as indicated in the diagram. Starting from vertex P , paths can be travelled to vertex Q along connected line segments. If each movement along the path takes one closer to Q , the number of possible paths from P to Q is



- (A) 46 (B) 90 (C) 36 (D) 54 (E) 60