Co-op, Page 1: Team answers must be on the *coloured* page.
Answers on a white page will not be graded.

1. The positive difference between two perfect squares is 60. What is the largest possible sum of the two perfect squares?

1. _____

2. How many digits are there in the decimal representation of

$$10 \times 10^2 \times 10^3 \times 10^4 \times \cdots \times 10^{2006} \times 10^{2007}?$$

2. _____ digits

3. When plotted in the standard rectangular coordinate system, $\triangle ABC$ has vertices $A(12, 0)$, $B(0, 10)$, and $C(2, 1)$. How many square units are in the area of $\triangle ABC$?

3. _____ units^2

4. Call an integer n "triply odd" if when you divide n by 3, you get an odd integer whose digits add up to an odd multiple of 3. How many triply odd integers are there between 1 and 300?

4. _____ integers

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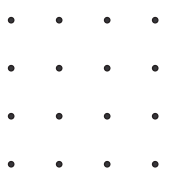
5. The figure below is a 4 by 4 grid of points. Each point is 1 cm from its nearest horizontal and vertical neighbours. Two of these 16 points are chosen at random. What is the probability that they do not lie in the same horizontal row? Express your answer as a common fraction.



5. _____

6. How many ordered pairs (a, b) are there such that a and b are integers and $a^2b = -1024$?

6. _____ pairs

7. An election was held for a joint grade 8/9 rep. Only grade 8 and grade 9 students could vote, and everyone voted for one of Alicia and Beti. Of the students who voted for Alicia, three-quarters were in grade 8. (Note that this does *not* mean that three-quarters of grade 8 students voted for Alicia.) Of the students who voted for Beti, four-fifths were in grade 9. An equal number of grade 8 and grade 9 students voted. What fraction of all the students voting voted for Alicia?

7. _____

Co-op, Page 3: Team answers must be on the *coloured* page.
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8. Let p_1, p_2, p_3, p_4, ... be all the primes, listed in increasing order. So $p_1 = 2$, $p_2 = 3$, $p_3 = 5$, and so on. Let N be the smallest integer such that

$$p_1 + p_2 + p_3 + \cdots + p_N > 2007.$$

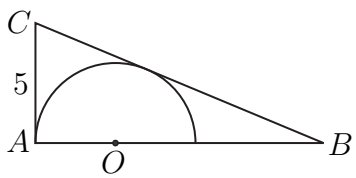
What is the value of p_N? Note that we want p_N, not N.

8. _____

9. How many ordered 5-tuples (p, q, r, s, t) are there such that: (i) the sequence p, q, r, s, t is an *arithmetic sequence*; (ii) p, q, r, s, and t are positive integers; (iii) $p < q$; and (iv) $p + q + r + s + t = 1000$?

9. _____ sequences

10. Let $\triangle ABC$ be right-angled at A. A semicircle with radius 3 units has center O on the line AB, passes through A, and is tangent to the line segment BC. If AC has length 5 units, what is the length of AB? Express your answer as a common fraction. (The diagram is not drawn to scale.)



10. _____ units