Year 7 Term 1 Homework

Student Name: _____	**Grade**: _____
Date: _____	**Score**: _____

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5 Year 7 Term 1 Week 5 Homework

5.1 Number Theory

5.1.1 Special Numbers

Exercise 5.1.1

1. *Make up four palindromic numbers that have 5 digits.*
   a. _____ *, b.* _____ *, c.* _____ *d.* _____ *;*

2. *Write down the first 6 odd square numbers:*
   a. _____ *, b.* _____ *, c.* _____ *, d.* _____ *, e.* _____ *, f.* _____ *;*

3. *Write down the first 6 even square numbers:*
   a. _____ *, b.* _____ *, c.* _____ *, d.* _____ *, e.* _____ *, f.* _____ *;*

4. *Evaluate each of the following:*
   $[(3 \times 3) - 1] \div 8 =$ _____
   $[(5 \times 5) - 1] \div 8 =$ _____
   $[(7 \times 7) - 1] \div 8 =$ _____
   Continue this pattern for another three lines. What kind of numbers are the answers?

   _____

   _____

   _____

5. *Calculate the product of the 6th square number and the 5th triangular number.*

   _____

   _____

6. *Find two square numbers whose difference is 24.* _____

7. *Find the first 2-digit square number whose digit sum is a odd number.* _____

8. *Find the first square number with more than one digit and is also a palindrome.* _____

9. *Find the square number which when doubled and then increased by 2 gives another square number.* _____

10. *Find the first 4 digit square number.* _____

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5.1.2 Fibonacci Numbers

Exercise 5.1.2 Further Applications

1. *The pattern below highlights an interesting relationship between sets of three consecutive Fibonacci numbers:*

   For 2, 3, 5: $(3 \times 3) = (2 \times 5) - 1$

   For 5, 8, 13: $(8 \times 8) = (5 \times 13) - 1$

   (a) *Is this pattern still true for 13, 21, 34?*

   (b) *How should we adjust the pattern for 3, 5, 8 and 8, 13,21?*

2. *Complete the next three lines of this pattern. What do you notice?*

   $1^2 + 1^2 = 2 = 1 \times 2$

   $1^2 + 1^2 + 2^2 = 6 = 2 \times 3$

   $1^2 + 1^2 + 2^2 + 3^2 = 15 = 3 \times 5$

3. *Take any four consecutive Fibonacci numbers such as 2, 3, 5, 8. or 3, 5, 8, 13.*

   (a) *Find the product of the inner pair of numbers and the product of outer pair of numbers.*

   (b) *Repeat this for two more sets of four consecutive Fibonacci numbers. What do you notice?*

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5.1.3 Divisibility Principles for sums and differences

- For whole numbers a, b and d, if a and b are each divisible by d, then the sum and the difference of a and b are each divisible by d.
- For whole numbers a, b and d, if a is divisible by d but b is not, then neither the sum nor the difference a and b is divisible by d.

Exercise 5.1.3 Determine if each of the following sums and differences is divisible by 7.

1. *56 + 21* _____
2. *42 + 56* _____
3. *240 - 49* _____
4. *770 - 450* _____

Exercise 5.1.4

1. *Suppose that a person was born in 1995. Will the number of the year of that person's 63rd birthday be divisible by 5? Explain why.*

   _____

   _____

2. *Neither 40 nor 32 is divisible by 9. However, the sum* $(40 + 32 = 72)$ *is divisible by 9. Does this contradict the divisibility principle for the sums and difference?*

   _____

   _____

3. *How can you determine if a whole number is divisible by 25 without dividing?*

   _____

   _____

   _____

4. *Can each of the following numbers of eggs be packed in cartons that each contain exactly on dozen eggs with none left over?*

   (a) *5824* _____

   (b) *12054* _____

   (c) *428676* _____

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5.1.4 Multiples

- The multiples of a number are the numbers into which it can divide without remainder.
- The lowest common multiple of two or more numbers is the smallest number into which they all divide.

Exercise 5.1.5 Find the LCM of these numbers.

1. *25, 40* _____
2. *10, 15, 20* _____
3. *8, 10 and 12* _____
4. *4, 6, and 9* _____
5. *45, 75, and 175* _____

Exercise 5.1.6

1. *At a street parade, the local scout troop found that they could arrange themselves in rows of exactly 6, exactly 7 or exactly 8, with no one left over. What is the least number of scouts in the troop?*

2. *David has a collection of coins that can be arranged in piles that each contain exactly 9 coins. His coins can also be arranged in piles that each contain exactly 10 coins and exactly 12 coins. What is the least number of coins in his collection?*

3. *If a certain number is divisible by 2, 3, 4 or 5, the respective remainders are 1, 2, 3 and 4. What is the least natural number that satisfies these conditions?*

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5.1.5 Problem solving

Exercise 5.1.7

1. *Michael saved all his 20-cent and 50-cent coins. When he counts them he finds he has 68 coins amounting to $25.30. How many of each type of coin does he have?*

2. *One bottle holds 250 mL more than another. When the smaller one is three quarters full it holds as much as the larger one when it is half full. What is the capacity of each bottle?*

3. *15 boys were given an equal number of sweets each. 3 of the boys, however dislike sweets and they gave up their share to the rest. As a result, the remaining boys received 3 more sweets each. What was the total number of sweet given to the boys?*

4. *Seven girls were each given a booklet of raffle tickets to sell. However, four of the girls had to prepare for their examination, so they passed their booklets to the other girls. as a result, each of the rest girls had to sell another twenty tickets.*

   (a) *How many raffle tickets were there in each booklet?*

   (b) *Find the total number of tickets given to the girls.*

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5.1.6 Diagnostic Test

1. Twice a number plus five is the same as five times the number minus sixteen. Find that number. [5]

1. _____

2. A number divided by three, plus nine equals twice the number minus sixteen. Find the number. [5]

2. _____

3. Which digit can never be found in the units place of a palindromic number? [5]

3. _____

4. Calculate the quotient of the 9th and 5th triangular numbers. [5]

4. _____

5. What year in the 21st century is a perfect square? [5]

5. _____

6. Add 45897 to 23873. The result is then subtracted by 34871. Express your answer to the nearest ten. [5]

6. _____

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7. Helen was given this number: 45903. Form the largest number and the smallest number from the digits in Helen's number and find their difference. [5]

7. _____

8. Find the LCM of 8, 12 and 18. [5]

8. _____

9. 12 years ago, the difference in age between Tony and Mike was 38. If Tony is 25 years old now, how old was Mike 12 years ago? [10]

9. _____

10. For every pair of shoes sold, Mary is paid \$3. If she sells 5 pairs of shoes, she is paid a bonus of \$4. How much will she be paid if she sells 18 pairs of shoes? [10]

10. _____

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11. Peter is 24 years older than David. In 12 years' time, their total age will be 84 years. Find their present ages. [10]

11. _____

12. If a class of children is separated into group of 5 children, 2 children will be left over. If the class is separated into groups of 6 children, 3 children will be left over. What is the smallest number of children the class could have? [10]

12. _____

13. From her pocket money, Crystal spent thrice the amount that she saved every month. When she spent \$20 less, she found that she could save \$40. How much was her pocket money? [10]

13. _____

14. 18 children received an equal number of sweets each. 12 of the children gave up their share of sweets which were distributed equally among the rest. As a result, the remaining children received 8 more sweets each. What was the total number of sweets given to the children? [10]

14. _____

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5.2 Maths Challenge

Exercise 5.2.1 Solve the following equations:

1. $-5(3x + 2) = -40$

2. $9(8 + 5x) = 108$

3. $2(4 + 3x) + 5(2x - 3) = 137$

4. $4(9 - 4x) - 3(16 - 3x) = 23$

5. $2(x + 3) + 5(x + 2) = 4(9 - 4x) - 3(16 - 3x)$

6. $\frac{4x+4}{10} = \frac{5+3x}{8}$

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