Year 7 Term 1 Homework

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

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7 Year 7 Term 1 Week 7 Homework

7.1 Number Theory

7.1.1 Factors and Multiples

Exercise 7.1.1

1. *List all multiples of 7 between 20 and 50.*
2. *Find the 7th multiple of 8.*
3. *If 1308 is a multiple of 4, find the next 4 multiples of 4.*
4. *Write the smallest Fibonacci number with factors of 3 and 7.*

7.1.2 Prime and composite numbers

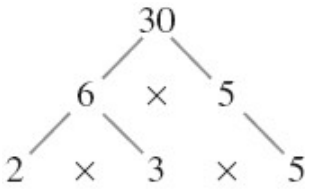
- To test whether a number is prime or composite, test for divisibility by all primes are less than or equal to the square root of the number.
- If the number is not divisible by any of these primes, then the number itself is prime.

Exercise 7.1.2

1. *Express each of these numbers as the sum of two primes:*
   (a) *50*
   (b) *28*
   (c) *84*
2. *Express each of these numbers as the sum of three primes:*
   (a) *55*
   (b) *69*
   (c) *99*
3. *Determine whether these numbers are prime of composite:*
   (a) *109*
   (b) *117*
   (c) *187*

7.1.3 Prime factors

The factors of a number can be found by listing all possible products of the prime factors one at a time, two at a time, three at a time etc. For example:



Now using the prime factors 2, 3 and 5:

- one at a time: 2, 3, 5
- two at a time: $(2\times 3)=6$, $(2\times 5)=10$, $(3\times 5)=15$
- three at a time: $(2\times 3\times 5)=30$
- 1 is a factor of every number

$\therefore$ the factors of 30 are 1, 2, 3, 5, 6, 10, 15 and 30.

Exercise 7.1.3 Find the prime factors of each number, then use the method outlined above to find all factors of the following:

1. *8 and 42*

2. *8 and 66*

3. *16 and 210*

4. *16 and 330*

5. *12 and 60*

7.1.4 Square and cube roots

- Finding the square root ($\sqrt{x}$) is the opposite of squaring a number (x^2).
- Finding the cube root ($\sqrt[3]{x}$) is the opposite of cubing a number (x^3).
- For example: $\sqrt{25} = \pm 5$; $\sqrt[3]{8} = 2$.

Example 7.1.1 Find the value of each of the following:

1. $\sqrt{441} = \sqrt{3 \times 3 \times 7 \times 7} = 3 \times 7 = \pm 21$
2. $\sqrt{1600} = \sqrt{4 \times 4 \times 10 \times 10} = 4 \times 10 = \pm 40$
3. $\sqrt[3]{27000} = \sqrt{3 \times 3 \times 3 \times 10 \times 10 \times 10} = 3 \times 10 = 30$

Exercise 7.1.4 Find the value of each of these square roots or cube roots:

1. $\sqrt{49}$ _____
2. $\sqrt{4900}$ _____
3. $\sqrt{64}$ _____
4. $\sqrt{640000}$ _____
5. $\sqrt{121}$ _____
6. $\sqrt[3]{64}$ _____
7. $\sqrt[3]{64000}$ _____
8. $\sqrt[3]{125}$ _____
9. $\sqrt{1}$ _____
10. $\sqrt[3]{1000}$ _____

Exercise 7.1.5 Evaluate each of the following:

1. $\sqrt{4^3}$ _____
2. $\sqrt{9^4}$ _____
3. $\sqrt[3]{8^2}$ _____
4. $\sqrt[3]{64^2}$ _____

Exercise 7.1.6 Consolidation

1. *Evaluate each of the following:*

   (a) $\sqrt{12+13}$

   (b) $\sqrt{10^2+5^3}$

   (c) $\sqrt{2^4\times 3^2}$

   (d) $\sqrt[3]{40\div 5}$

   (e) $\sqrt[3]{8\times 27}$

2. *Use the order of operations to evaluate each of the following:*

   (a) $5+\sqrt{9}\times 4$

   (b) $\sqrt[3]{8}+\sqrt{16}\times 6$

   (c) $\sqrt{144}\div 6+3^2$

   (d) $\sqrt{49}\times\sqrt[3]{1000}\div\sqrt{25}$

   (e) $\sqrt{25\times 4}-\sqrt[3]{125}\times 4$

3. *Find the value of each of the following:*

   (a) $\sqrt{49}+\sqrt{36}$

   (b) $\sqrt{144}\div\sqrt{16}$

   (c) $\sqrt[3]{64}\times\sqrt{36}\times\sqrt[3]{27}$

   (d) $\sqrt{81}-\sqrt[3]{125}$

   (e) $\sqrt[3]{8}+\sqrt{121}-\sqrt[3]{27}$

4. *Evaluate:*

   (a) $\sqrt{4\times 9}$ *and* $\sqrt{4}\times\sqrt{9}$

   (b) $\sqrt{16\times 9}$ *and* $\sqrt{16}\times\sqrt{9}$

   (c) $\sqrt{16+9}$ *and* $\sqrt{16}+\sqrt{9}$

   (d) Does $\sqrt{a}\times\sqrt{b}=\sqrt{a\times b}$ *?*

   (e) Does $\sqrt{a}+\sqrt{b}=\sqrt{a+b}$ *?*

Exercise 7.1.7 Further Applications

1. *Evaluate:*

   (a) $\sqrt{20} \times \sqrt{5}$ _____

   (b) $\sqrt{18} \times \sqrt{2}$ _____

   (c) $\sqrt{24} \times \sqrt{6}$ _____

   (d) $\sqrt{25} \times \sqrt{4}$ _____

   (e) $\sqrt{16} \times \sqrt{4}$ _____

2. *Find the value of:*

   (a) $\sqrt{196}$ *if* $196 = 2 \times 2 \times 7 \times 7$ _____

   (b) $\sqrt{324}$ *if* $324 = 2^2 \times 3^4$ _____

   (c) $\sqrt{1764}$ *if* $1764 = 2^2 \times 3^2 \times 7^2$ _____

   (d) $\sqrt{1296}$ *if* $1296 = 2^4 \times 3^4$ _____

   (e) $\sqrt{7056}$ *if* $7056 = 2^4 \times 3^2 \times 7^2$ _____

3. *Find the value of:*

   (a) $\sqrt[3]{216}$ *if* $216 = 2 \times 2 \times 2 \times 3 \times 3 \times 3$ _____

   (b) $\sqrt[3]{1728}$ *if* $1728 = 2^6 \times 3^3$ _____

   (c) $\sqrt[3]{91125}$ *if* $91125 = 3^6 \times 5^3$ _____

   (d) $\sqrt[3]{125000}$ *if* $125000 = 5^3 \times 10^3$ _____

   (e) $\sqrt[3]{5832}$ *if* $216 = 3^3 \times 6^3$ _____

4. *Evaluate each of these:*

   (a) $\sqrt{225}$ = _____

   (b) $\sqrt{490000}$ = _____

   (c) $\sqrt[3]{8000000}$ = _____

   (d) $\sqrt{16000000}$ = _____

   (e) $\sqrt[3]{125000000}$ = _____

7.1.5 Problem Solving

Exercise 7.1.8

1. *The length of a rectangle is 20% that of its perimeter. The breadth of the rectangle is 12 cm. Find the area of the rectangle.*

2. *The breadth of a rectangle is 20% that of its perimeter. If the length of the rectangle is 12 cm longer than its breadth, find the area of the rectangle.*

3. *The length of a rectangle is 140% of its breadth. The perimeter of the rectangle is 240 cm. Find the area of the rectangle.*

4. *School A has 25% more pupils than school B. School C has 40% fewer pupils than school B. School A has 390 more pupils than school C. What is the total enrolment of the three schools?*

5. *Divide the greatest 4-digit even whole number by 6. What is the answer?*

7.1.6 Diagnostic Test 7

1. Evaluate $\sqrt{36} + \sqrt[3]{64}$ [5]

1. _____

2. Evaluate $\sqrt[3]{8000} - \sqrt[3]{1000}$ [5]

2. _____

3. Evaluate $\sqrt{36} \times \sqrt{49} \times \sqrt[3]{64}$ [5]

3. _____

4. Evaluate $\sqrt[3]{27000} \div \sqrt[3]{125000}$ [5]

4. _____

5. Find the value of $\sqrt{2704}$ if $2704 = 2^4 \times 13^2$ [5]

5. _____

6. Does $\sqrt{25} \times \sqrt{16} = \sqrt{25 \times 16}$ [5]

6. _____

7. If $411 = 3 \times 3 \times 7 \times 7$ and $1134 = 2 \times 3 \times 3 \times 3 \times 3 \times 7$, find the HCF and LCM of these two numbers. [5]

7. _____

8. If $3575 = 5^2 \times 11 \times 13$ and $33275 = 5^2 \times 11^3$, find the HCF and LCM of these two numbers. [5]

8. _____

9. Find the first three-digit prime with a 6 in the tens place. [10]

9. _____

10. Use the divisibility test to determine whether 87 is prime or composite. [10]

10. _____

11. By how much does the sum of the first seven Fibonacci numbers exceed the sum of the first four? [10]

_____

_____

_____

11. _____

12. Express 1936 in index form. [10]

12. _____

13. Alice spent \$260 on food and $\frac{2}{5}$ of the remainder on transport. She had \$120 left. How much money did she have at first? [10]

_____

_____

_____

13. _____

14. In order to complete a reading list during the Premiers Reading Challenge competition, Victor read $\frac{2}{5}$ of books on first month, and 36 books on second month. He then had another 42 books to read. How many books did he read on the first month? [10]

_____

_____

_____

14. _____

7.1.7 Miscellaneous Exercise

Exercise 7.1.9

1. *Find the LCM of the following:*

   (a) *LCM (27 and 48).*

   (b) *LCM ($4p^3qr^2$ and $72p^2r^3$)*

   (c) *LCM (26, 65 and 130)*

2. *If* $4900 = 2^x \times 5^y \times 7^z$*, find the value of x, y and z.*

3. *Find the HCF of the following:*

   (a) *HCF (63 and 819).*

   (b) *HCF (169, 2 and 197).*

Exercise 7.1.10

1. *Express 1584 as a product of prime factors.*

2. *What is the greatest factor of 1584?*

3. *Express 5040 as a product of its prime factors using index notation.*

4. *What is the largest prime number that is a factor of 5040?*

5. *There are 252 marbles in a bag. If $\frac{2}{7}$ of them are red, $\frac{4}{9}$ of the remainder are green and the rest are blue, how many blue marbles are there?*

6. *Two police cars, P and Q, from a police station patrol a residential area every night. Car P takes 25 minutes to cover a route, while car Q takes 40 minutes to cover a different route. If both of them start at midnight, at what time will they meet at the police station again?*

7. *Jason's piggy bank contains a large number of 5¢ coins. The coins can be divided into equal shares amount 3, 4, 5, 6, 7, or 8 children with no coins left over each time. What is the least number of coins can Jason have?*

7.1.8 Math Challenge

Exercise 7.1.11

1. *There are twice as many litres of juice in one container as in another. If 4 litres of juice are used from each of the two containers, there will be three times as many litres of juice in one container as in the other. How may litres of juice did the large container have at the beginning?*

2. *Suppose the number of units in each of the length and width of a rectangle are prime numbers and the perimeter is 36 units. What is the largest number of square units the area could have?*

3. *A water tap can fill the water container in 20 minutes. The drain, when opened, can empty the full container in 25 minutes. Suppose the water container is empty and the tap and the drain are both opened at the same time. How long will it take to fully fill the container?*

4. *Find the greatest prime number, P, such that 9 times P is less than 400?*

5. *Suppose* $5! = 5 \times 4 \times 3 \times 2 \times 1$. *Simplify the following expression* $\frac{7!-6!}{3!\times 5!}$ *in simplest form.*