

Year 10 Quiz 1 Solutions- IGCSE Maths 2023

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This examination has 13 questions, for a total of 24 points and 5 bonus points.

Answer the questions in the spaces provided on the question sheets. If you run out of room for an answer, continue on the back of the page. You must show all of your work for credit

Full Name in English: _____

Nickname: _____

No Calculator Allowed. You must show all of your work for credit

Number Sets and Roots

INSTRUCTIONS Choose the most correct answer.

1. (2 points) Which number is a natural number? **Natural numbers are not decimals, fractions and cannot be negative**

A. 100
B. $\frac{1}{3}$
C. -13
D. 0.25

2. (2 points) Evaluate and simplify:

$$\sqrt{2} \times \sqrt{2}$$

Recall that for roots we have that

$\sqrt{a} \times \sqrt{b} = \sqrt{a \times b}$ So in this case we can get $\sqrt{2} \times \sqrt{2} = \sqrt{4} = 2$

A. 16
B. 4
C. $\sqrt{16}$
D. **2**

3. (2 points) Which statement is true?

A. The natural numbers are not a subset of the integers.
B. **The integers are the set of all natural numbers and their opposites.**
C. The integers include all irrational numbers.
D. The irrational numbers are in the set of natural numbers.

4. (2 points) Evaluate the expression $\sqrt[3]{64}$. You may consider only roots greater than zero.

$$\sqrt[3]{64} = \sqrt[3]{4^3} = 4 = 2$$

A. 8
B. **2**
C. 16
D. This number is irrational

5. (2 points) Evaluate the expression

$$\frac{10}{\sqrt{100}}$$

$$\frac{10}{\sqrt{100}} = \frac{10}{10} = 1$$

HCF, LCM and Primes

6. (2 points) Use the prime factorisation method to find the HCF and LCM for 14 and 24. Be sure to use the factor tree.

The prime factorisations

$$14 = 2 \times 7$$

$$24 = 2^3 \times 3$$

To find the HCF take the lowest indexed prime that appears in both lists.

$$\text{HCF} = 2$$

To find the LCM take the highest indexed prime that appears in each list

$$\text{LCM: } 2^3 \times 3 \times 7 = 168$$

7. (2 points) Use the prime factorisation method to find the HCF and LCM for 75 and 125. Be sure to use the factor tree.

The prime factorisations

$$75 : 3 \times 5^2$$

$$125 : 5^3$$

$$\text{HCF: } 5^2 = 25$$

$$\text{LCM: } 3 \times 5^3 = 375$$

Tests for Divisibility

8. (2 points) Is the number 4484808 divisible by 6? Demonstrate if it is or not using tests for divisibility. Do not simply divide the number.

A number is divisible by 6 if it is divisible by both 2 and 3.

Any number that ends in an even digit can divide 2.

So this number can divide 2.

If you take the sum of the digits and that sum can divide 3, then the number itself can divide 3.

$$4 + 4 + 8 + 4 + 8 + 0 + 8 = 36. \text{ Since 36 can divide 3, the number can divide 3.}$$

Since it can divide both 2 and 3, it can also divide 6

9. (2 points) Using the tests for divisibility studied in class, show that 471111228 is divisible by 9. Do not divide.

If the sum of the digits can divide 9, then the number can divide 9

$$4 + 7 + 1 + 1 + 1 + 1 + 2 + 2 + 8 = 27 \text{ Since 27 can divide 9, the number can divide 9}$$

Rational and Irrational Numbers

10. (2 points) If possible, write $0.\overline{5}$ as the ratio of two integers in simplest form.

$$0.\overline{5} = 0.55555555\ldots$$

$$\text{Let } x = 0.\overline{5}$$

$$\text{Let } 10x = 5.\overline{5}$$

$$10x - x = 5$$

$$9x = 5$$

$$x = \frac{5}{9}$$

A. $\frac{5}{9}$

B. $\frac{1}{5}$

C. $\frac{1}{2}$

D. The number is irrational.

11. (2 points) If possible, write $\sqrt{5\frac{4}{9}}$ as the ratio of two integers.

$$\sqrt{5\frac{4}{9}} = \sqrt{\frac{49}{9}} = \frac{7}{3}$$

A. $\frac{49}{9}$

B. $\sqrt{\frac{49}{9}}$

C. $\frac{7}{3}$

D. This number is irrational

12. (2 points) If 0.1234 is rational, demonstrate this fact by writing it as a ratio of integers. You do not need to simplify it.

$$\frac{1234}{1000}$$

Bonus

13. (5 points (bonus)) A man wants to send a valuable necklace to his mother in Russia. However, the postal service in his country is known to be untrustworthy. If they find a package with a lock, they'll try to pick it and steal the contents. If they find a package without a lock, they'll open it, see the necklace, and steal it. What should the man do to ensure that his necklace reaches his mother safely?

Rules:

1. Any package sent through the postal service might be opened for inspection.
2. If the postal service finds a package with a lock, they'll attempt to pick the lock. If they can't, they won't take anything but will still deliver the package.
3. If they find a package without a lock, they'll open it, inspect the contents, and may steal valuable items.
4. Both the man and his mother have as many locks and keys as they need, but they only have their own keys to their own locks. Sending a key through the mail risks it being copied by the postal service.
5. The mother cannot send anything to her son - communication can only go one way.

The man must put his own lock on the box and then send it to this mother. When she gets it, she add her own lock on the box as well. Now the box has two locks. She sends it back to her son. He removes his lock. It now has only

his mother's lock. He sends it back to her. She remove her lock and is happy about the necklace.