

IB Math Studies Summer Packet

Welcome to IB Math Studies, just a few things I want to communicate with you before school is out.

1) Reminder: Class starts at 7:20

2) You will need a Ti-84 Plus or higher (it needs the option of a frequency list with stat-calculations)

3) The summer packet is very short and it should all be review. We will review it quickly and take an assessment over it the first week or so of school.

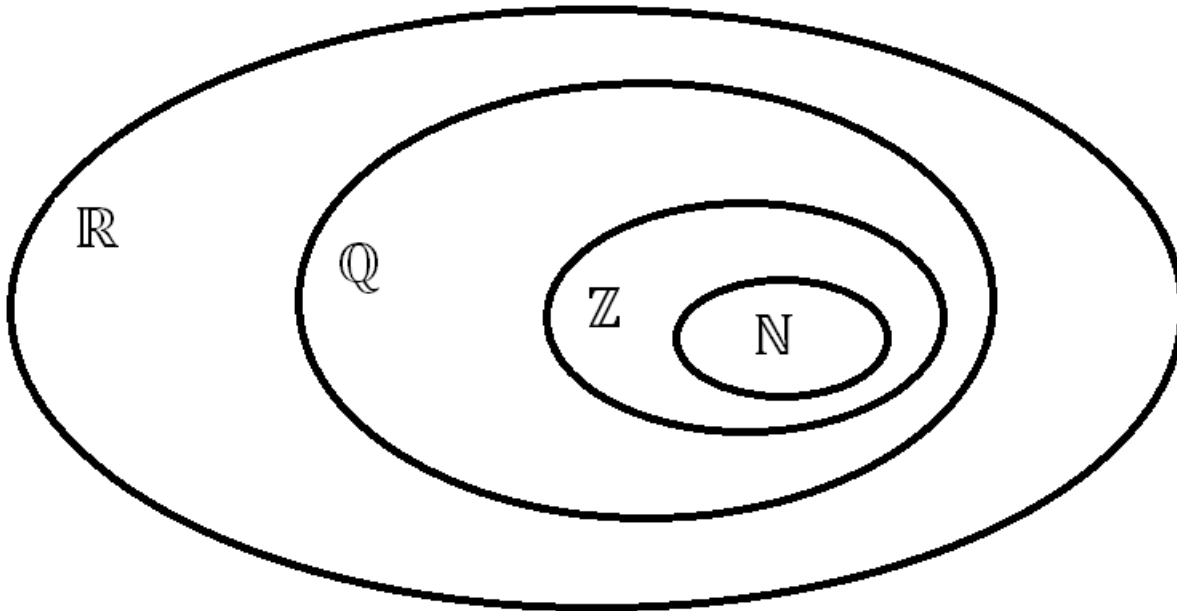
Chapter 1

\mathbb{R} = real numbers

\mathbb{Q} = rational numbers

\mathbb{Z} = integers

\mathbb{N} = natural numbers (counting numbers starting at 1)



Problem 1: Homework

3. Consider the numbers 3 , -5 , $\sqrt{7}$, 2^{-3} and 1.75 . Complete the table below, placing a tick (\checkmark) to show which of the number sets, \mathbb{N} , \mathbb{Q} and \mathbb{R} these numbers belong to. The first row has been completed as an example.

	\mathbb{N}	\mathbb{Q}	\mathbb{R}
3	\checkmark	\checkmark	\checkmark
-5			
$\sqrt{7}$			
2^{-3}			
1.75			

[6 marks]

Chapter 1

Order of operations: **PEMDAS**

Parenthesis; **M**ultiplication/**D**ivision (left to right); **A**ddition/**S**ubtraction (left to right)

Homework: Order of Operations · ÷

1. $8 + 7 \cdot 9$

11. $12 + 4^2$

2. $35 - (17 - 2) \div 5$

12. $24 - 9 \cdot 2 + 6 \div 3$

3. $\frac{90 - 22}{28 - 11}$

13. $\frac{45 + 3}{9}$

4. $12(2 + 7) - 24 \div 12$

14. $4(9 - 3) \div (8 - 2)$

5. $26 - [(25 - 11) - 2^3]$

15. $(8^2 - 2^5) \div (24 \div 6) + 3^2$

6. $\frac{12(30 - 12)}{3^2}$

16. $\frac{5(16 - 5) - 1}{4^2 - 7}$

Substitute and evaluate: $x = 8$, $y = 6$, $m = 3$, $p = \frac{1}{2}$, $n = \frac{3}{4}$

7. $4x - 2m$

17. $5y + 8p$

8. $nx y \div m$

18. $2(3x + 6) \div (10m)$

9. $2ny + x$

19. $(x + y) \div p$

10. $6p + 8n$

20. $my - 2x$

Chapter 2 Significant Digits

On the IB exam all solutions are written as exact solutions or 3 significant digits, so it is very important that you understand significant digits.

RULES FOR SIGNIFICANT FIGURES

1. All non-zero numbers ARE significant.

The number 33.2 has THREE significant figures because all of the digits present are non-zero.

2. Zeros between two non-zero digits ARE significant.

2051 has FOUR significant figures. The zero is between a 2 and a 5.

3. Leading zeros are NOT significant.

They're nothing more than "place holders." The number 0.54 has only TWO significant figures. The number 0.0032 also has TWO significant figures. All of the zeros are leading.

4. Trailing zeros to the right of the decimal ARE significant.

There are FOUR significant figures in 92.00. 92.00 is different from 92: a scientist who measures 92.00 milliliters knows his value to the nearest 1/100th milliliter; meanwhile his colleague who measured 92 milliliters only knows his value to the nearest 1 milliliter. It's important to understand that "zero" does not mean "nothing." Zero denotes actual information, just like any other number. You cannot tag on zeros that aren't certain to belong there.

5. Trailing zeros in a whole number with the decimal shown ARE significant.

Placing a decimal at the end of a number is usually not done. By convention, however, this decimal indicates a significant zero. For example, "540." indicates that the trailing zero IS significant; there are THREE significant figures in this value.

6. Trailing zeros in a whole number with no decimal shown are NOT significant.

Writing just "540" indicates that the zero is NOT significant, and there are only TWO significant figures in this value.

7. Exact numbers have an INFINITE number of significant figures.

This rule applies to numbers that are definitions. For example, 1 meter = 1.00 meters = 1.0000 meters = 1.00000000000000000000 meters, etc.

IB Math Studies Chapter 2 Significant Digit Worksheets

Note: This worksheet is probably more difficult and detailed than you will need on the IB Exam, but I want to make sure you have a good understanding of this. For those of you taking chemistry, I am sure this will be a help to you.

Give the number of significant digits in each of the following measurements:

- | | | |
|--------------------|---------------------|-------------------|
| 1. 1278.50 _____ | 7. 8.002 _____ | 13. 43.050 _____ |
| 2. 120000 _____ | 8. 823.012 _____ | 14. 0.147 _____ |
| 3. 90027.00 _____ | 9. 0.005789 _____ | 15. 6271.91 _____ |
| 4. 0.0053567 _____ | 10. 2.60 _____ | 16. 6 _____ |
| 5. 670 _____ | 11. 542000. _____ | 17. 3.47 _____ |
| 6. 0.00730 _____ | 12. 2653008.0 _____ | 18. 387465 _____ |

Round off the following numbers to three significant digits:

- | | |
|---------------------|-------------------|
| 19. 120000 _____ | 22. 4.53619 _____ |
| 20. 5.457 _____ | 23. 43.659 _____ |
| 21. 0.0008769 _____ | 24. 876493 _____ |

Chapter 3

LAWS OF EXPONENTS

PRODUCT RULE: $a^m \cdot a^n = a^{m+n}$ (when multiplying like bases, add the powers)

POWER RULE: $(a^m b^n)^p = a^{mp} b^{np}$ (when taking a monomial to a power, multiply the powers including the coefficient)

QUOTIENT RULE: $\frac{a^m}{a^n} = a^{m-n}$ (when dividing with like bases, subtract the powers)

ZERO POWER RULE: $a^0 = 1$ (any term to the zero power is one)

NEGATIVE POWER RULE: $a^{-n} = \frac{1}{a^n}$ and $\frac{1}{a^{-n}} = a^n$ (take the reciprocal of the variable to the negative power)

HOMEWORK (SIMPLIFY EACH PRODUCT)

1) $10^{12} \cdot 10^{35} =$

2) $a^7 \cdot a^{12} =$

3) $c^3 \cdot c^8 =$

4) $d^7 \cdot d^9 =$

5) $x^{2e} \cdot x^{8e} =$

6) $w^{103} \cdot w^{1030} =$

7) $a^6 \cdot b^5 =$

8) $10^a \cdot 10^b =$

9) $g^{12} \cdot g^{19} \cdot g^{11} =$

10) $(2x^2)(4x^3y^2) =$

11) $(-3a^2b)(6ab^4c) =$

12) $(7q^5)(12q^3r^5) =$

13) $(11c^8)(-10c^4d) =$

14) $(9x^{10}z^2)(-x^5y^3) =$

15) $(-8f^6g)(-7f^2g^5h) =$

16) $(x^2)^3 =$

17) $(a^7)^5 =$

18) $(y^{13})^4 =$

19) $(w^{-21})^{-15} =$

20) $(5^2)^3 =$

21) $(23^7)^8 =$

22) $(-y^5)^4 =$

23) $(4y^3)^2 =$

24) $(8c^5)^2 =$

25) $(-3h^9)^3 =$

26) $(y^4d^6)^8 =$

27) $(-c^5h^6)^4 =$

28) $(-15h^9k^7)^3 =$

29) $(k^9)^5(k^3)^2 =$

30) $(3y^6)^2(x^5y^2z) =$

31) $(4h^3)^2(-2g^3h)^3 =$

32) $(14a^4b^6)^2(a^6c^3)^7 =$

33) $\left(\frac{x}{y}\right)^6 =$

34) $\left(\frac{5c}{d^2}\right)^2 =$

35) $\left(\frac{4d^3}{c^5}\right)^3 =$

36) $\left(\frac{3w}{g^6}\right)^4 =$

$$37) \left(\frac{-4s^6}{t^3r^5} \right)^3 =$$

$$38) \left(\frac{-2d^{11}f^6}{c^{18}} \right)^2 =$$

$$39) \left(\frac{2d^4}{4e} \right)^3 =$$

$$40) \frac{6r^3}{2r} =$$

$$41) \frac{-40s^6}{20s^3} =$$

$$42) \frac{21d^{18}e^5}{7d^{11}e^3} =$$

$$43) \frac{-16w^7r^2}{-4wr} =$$

$$44) \frac{a^5b^5c^5}{-a^2b^3c^4} =$$

$$45) \frac{4.2x^4y^{14}}{0.6x^9y^5} =$$

$$46) \left(\frac{-24t^6}{8t^3} \right)^5 =$$

$$47) \left(\frac{d^{11}f^{16}}{d^6f^6} \right)^3 =$$

$$48) \left(\frac{7d^2}{14d^4} \right)^5 =$$

Chapter 4

y intercept form: $y = mx + b$ m is the slope and b is the y-intercept

point slope form: $y - y_1 = m(x - x_1)$

Perpendicular = $\frac{-1}{m}$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ gradient is another term for slope

Homework:

1. The equation of a line L_1 is $3x + 2y = -8$

a) Write down the gradient of the line L_1 .

A second line L_2 is perpendicular to L_1

b) Write down the gradient of L_2 .

The point (6, -2) is on L_2 .

c) Determine the equation of L_2 .

d) The lines L_1 and L_2 intersect at point P. Use your calculator to find the coordinates of P.

2) A liquid is heated so that after 30 seconds of heating its temperature, T , is 25°C , and after 1 minute of heating the temperature is 40°C .

The temperature of the liquid at time t can be modelled by $T = at + b$, where t is the time in seconds after the start of the heating.

Using this model one equation can be formed is $30a + b = 25$

a) Using the model, write down a second equation in a and b .

b) Find the value of a and b .

c) Use the model to predict the temperature of the liquid 75 seconds after the start of heating.

3) 20,000 people attended a soccer match. Let x be the number of adults attending the soccer game and let y be the number of children attending the soccer game.

The cost of an adult ticket was 12 euros (EUR) and the cost of a child ticket was 5 euros (EUR).

a) Write down an equation in x and y .

b) Find the total cost for a family of 2 adults and 3 children.

The total cost of the tickets sold for the soccer game was 156,000 EUR.

c) Write down a second equation in x and y .

d) Write down the value of x and y .