## SIGNIFICANT FIGURES Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Measurement can only be as accurate and precise as 'the instrument that produced it. A scientist must be able to express the accuracy of a number, not just its numerical value. We can determine the accuracy of a number by the number of significant figures it contains.

|  |  |
| --- | --- |
|  |  |
|  | 1. All digits 1-9 inclusive are significant.

Example: 129 has 3 significant figures.1. Zeros between significant digits are always significant.

Example: 5,007 has 4 significant figures.1. Trailing zeros in a number are significant only if the number contains a decimal point.

Example: 100.0 has 4 significant figures.100 has 1 significant figure.1. Zeros in the beginning of a number whose only function is to place the decimal point are not significant.

Example: 0.0025 has 2 significant figures.1. Zeros following a decimal significant figure are significant.

Example: 0.000470 has 3 significant figures.0.47000 has 5 significant figures. |
|  |

Determine the number of significant figures in the following numbers.

1. 0.02

2. 0.020

6. 5,000.

7. 6,051.00

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 3. | 501 |   | 8. | 0.0005 |   |
| 4. | 501.0 |   | 9. | 0.1020 |   |
| 5. | 5,000 |   | 10. | 10,001 |   |

Determine the location of ·the last significant place value by placing a bar over the digit. (Example: 1.700)

1. 8040 6. 90,100

2. 0.0300 7. 4.7 x 10-8 **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

3. 699.5 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 8. 10,800,000

 4. 2.000 X 102 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 9. 3.01 X 10 21 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. 0.90100 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 10. 0.000410 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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## CALCULATIONS USING SIGNIFICANT FIGURES

Name \_

When multiplying and dividing, limit and round to the least number of significant figures in any of the factors.

|  |  |  |
| --- | --- | --- |
|  | **Example 1:** 23.0 cm x 432 cm x 19 cm = 188,784 cm3 The answer is expressed as 190,000 cm3 since 19 cm has only two significant figures. |  |
|  |

When adding and subtracting, limit and round your answer to the least number of decimal places in any of the numbers that make up your answer.

**Example 2:** 123.25 ml + 46.0 ml + 86.257 ml = 255.507mL.

The answer is expressed as 255.5 mL since 46.0 mL has only one decimal place.

Perform the following operations expressing the answer in the correct number of significant figures.

1. 1.35 m x 2.467 m = \_\_\_

2. 1,035 m2 + 42 m2 = \_\_\_

3. 12.01 mL + 35.2 mL + 6 mL = \_\_\_

4. 55.46 g - 28.9 g = \_\_

5. .021 cm x 3.2cm x 100.1 cm=\_\_\_\_

6. 0.15cm + 1.15cm + 2.051 cm= \_

7. 150L3 + 4L3 = \_\_\_\_\_\_\_\_

8. 505 kg - 450.25 kg = \_\_

9. 1.252 mm x 0.115 mm x 0.012 mm = \_

10. 1.278 x 103 m2 + 1.4267 x 102 m = \_\_

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**MATH HANDBOOK TRANSPARENCY MASTER**

**Significant Figures**

**3**

**Use with Appendix B, Significant Figures**

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**Rules for Significant Figures**

1. All nonzero figures are significant.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |

**721** mm *3 significant figures*

1. When a zero falls between nonzero digits, that zero is significant.

**106** K *3 significant figures*

1. When a zero falls after the decimal point and after a significant figure, that zero is significant.

**1.50** L *3 significant figures*

1. When a zero is used merely to indicate the position of the decimal, that zero is *not* significant.

*3 significant figures*

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **1 21**0 m0.0**53** m |
|  |  |  |

*2 significant figures*

1. All counting numbers and exact numbers are treated as if they have an infinite number of significant figures.

*infinite number of significant figures*

10 pairs

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**MATH HANDBOOK TRANSPARENCY WORKSHEET 3**

**Significant Figures**

**Use with Appendix B, Significant Figures**

1. For each of the measurements in the table below, determine if the underlined number is significant or not significant. Place a check mark in the appropriate box and in the box under the rule that you used to make your determination.

|  |  |  |  |
| --- | --- | --- | --- |
| **Measurement** | **Significant** | **Not Significant** | **Rule** |
| **1** | **2** | **3** | **4** | **5** |
| **a.** 3038 m |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **b.** 1.561 L |  |  |  |  |  |  |  |
| **c.** 0.074 mm |  |  |  |  |  |  |  |
| **d.** 5050 s |  |  |  |  |  |  |  |
| **e.** 3.007 km |  |  |  |  |  |  |  |
| **f.** 6.10°C |  |  |  |  |  |  |  |
| **g.** 821.0 g |  |  |  |  |  |  |  |
| **h.** 0.560 g |  |  |  |  |  |  |  |

1. Determine the number of significant figures in each of the following measurements.

**a.** 56 m **n.** 0.0021 m

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**b.** 1104 mL **o.** 30 015 g

**c.** 15 pairs **p.** 90 km **d.** 0.20 mol **q.** 12.0 cm **e.** 105,000 mm **r.** 0.0305 kPa

**f.** 6.02 L **s.** 50 gross **g.** 0.176 kPa **t.** 83.90 m/s2 **h.** 819,000.0 g **u.** 0.100 50 cg

**i.** 4.030 m3 **v.** 0.0510 kg

**j.** 0.005 42 s **w.** 6.12 X 105 mm

**k.** 49,000 km **x.** 4.01 X 102 s

**l.** 7.81 kg **y.** 60,000 X 103 g

**m.** 7.01 m/s **z.** 1.000 X 102 kPa

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