# ANSWERS

# Math and Business Skills Part 1 & 2ANSWERS

Part 1

# Math Skills for Entrepreneurs

# 1.1 Whole Number Operations (+, ÷)

Correct any errors in the table in

* total of All Units Sold Each Day
* total Units of Each Item Sold for Week
* average Number of Units per Item Sold per Day

# Try to use mental math and estimation first. Then check with a calculator.

# Example:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **The Campus Closet Shop -** Sportswear | | | | | | | | | |
| **Daily Unit Sales of** | **M** | **T** | **W** | **Th** | **F** | **S** | **S** | **Total Number of Units of Item Sold for Week** | **Average Number**  **of Units of Item Sold per Day** |
| school-emblem T-shirts | 2 | 5 | 3 | 10 | 14 | 15 | 14 | 63 | ~~20~~  **9**  **THINK: 20 seems too high to be the average per day.** |
| school-emblem sweatshirts | 0 | 0 | 2 | 1 | 4 | 5 | 9 | ~~31~~ **21**  **THINK: 31 seems high.** | 3 |
| school-emblem jackets | 1 | 0 | 0 | 0 | 0 | 8 | 5 | 14 | ~~1~~ **2**  **THINK: If the total is 14, 1 is too low to be the average.** |
| **Total of All Units Sold Each Day** | 3 | 5 | 5 | 11 | 18 | **~~47~~**  **28** | 28 |  |  |

Total units sold in the week?98

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Bob’s Bagels and Bakery** | | | | | | | | | |
| **Daily Unit Sales of** | **M** | **T** | **W** | **Th** | **F** | **S** | **S** | **Total Number of Units of Item Sold for Week** | **Average Number of Units of Item Sold per Day** |
| plain  bagels | 220 | 342 | 316 | 347 | 351 | 478 | 112 | ~~457~~ 2166 | ~~12~~ 309 |
| cheese  bagels | 75 | 117 | 129 | 134 | 120 | 233 | 67 | 875 | ~~450~~ 125 |
| raisin-wheat bagels | 51 | 39 | 45 | 12 | 44 | 35 | 13 | 239 | 34 |
| **Total Units Sold Each Day** | 346 | 498 | 490 | 493 | 515 | ~~246~~  746 | 192 |  |  |

**Total units sold in one week? 3280**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Music, Movies and More** | | | | | | | | | |
| **Daily Unit Sales** | **M** | **T** | **W** | **Th** | **F** | **S** | **S** | **Total Number of Units of Item Sold for Week** | **Average Number of Units of Item Sold per Day** |
| single CD’s | 29 | 73 | 52 | 47 | 118 | 217 | 190 | 726 | ~~304~~  104 |
| CD collections | 0 | 0 | 1 | 2 | 7 | 12 | 15 | ~~115~~ 37 | 5 |
| DVD’s | 15 | 12 | 21 | 22 | 45 | 59 | 63 | 237 | ~~21~~ 34 |
| **Total Units Sold Each Day** | ~~34~~  ~~44~~ | 85 | ~~54~~  74 | 71 | ~~203~~  170 | 288 | 268 |  |  |

**Total units sold in one week? 1000**

**Extras for Experts**

Why would a manager want to know the average unit sales per day, especially if the information was collected over several weeks?

e.g. S/he would see trends and better know which days are usually busiest so s/he could plan for more inventory (how many bagels to bake each day), schedule more staff, or stay open longer hours (to serve more customers).

# Math Skills for Entrepreneurs

# 1.2 Understanding Decimals

* **Concept**
* **Place Value**
* **Converting from Fractions**

The average cost of goods sold (COGS) per item in Germaine’s clothing store is thirteen dollars and ninety-six and a half cents.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **hundreds**  **of $s** | **tens of $s** | **Units of $s** | **decimal**  **point** | **tenths** | **hundredths** | **thousandths** |
| $ 0 | 1 | 3 | ● | 9 | 6 | 5 |

**Example:** Write the Business Fact quantities as decimals.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Business Fact:** | **Picture what it means:** | **Divide to change the fraction to a decimal:** | **Check/Think: Do I have the right number of places *before* and *after* the decimal point?** | **Write as a decimal** |
| The stock rose **three and one eight** points. | 3 1/8 = three whole points and one eighth of another point | 1 ÷ 8 = 0.125 or **one hundred and twenty-five thousandths** | There are no tens; three units; plus 125 thousandths = one place to the left of the decimal point, plus three decimal places to the right of the decimal point | **3.125** |

**A.** Complete the chart:

|  |  |  |  |
| --- | --- | --- | --- |
| The sales tax was ten dollars and twenty-three cents. | 23 ÷ 100 = | 10.23 | One ten, no units, so two places to the left of the decimal point, plus two decimal places to the right of the decimal point |
| One tenth of the staff was sick. | 1 ÷ 10 = | 0.1 | tenths = one decimal place |
| One third of the total floor was carpeted. | 3 ÷ 10 = | to 3 places  0.3 | Tenths,= one decimal place |
| Only 3 of every 100 buyers shopped online. | 3 ÷ 100 = | 0. 03 | hundredths = 2 decimal places |
| 3 in every thousand items sold were defective. | 3 ÷ 1000 = | 0.003 | thousandths = 3 decimal places |
| 4/5 of customers were female. | 4 ÷ 5 = | 0.8 | tenths = one decimal place |
| The visitors ate three pizzas and 3 of 8 slices in another pizza. | 3 ÷ 8 = | 3.375 | No tens, but three units, so one place to the left of the decimal point, plus three decimal places to the right of the decimal point |
| The sales tax was ten dollars and twenty-three cents. | 23 ÷ 100 = | 10.23 | One ten, no units, so two places to the left of the decimal point, plus two decimal places to the right of the decimal point |

|  |  |  |  |
| --- | --- | --- | --- |
| **Extras for Experts** | |  |  |
| **Business Fact:** | Change the fraction to a decimal: | Write  as a  decimal | **Check/ Think: What is the correct number of places *before* and *after* the decimal point to express the quantity?** |
| The storeroom was seventeen feet and 11 inches wide. | 11 ÷ 12 = 0.9166666 | 17.9167 | One ten and seven units, so two places to the left of the decimal point, plus (rounded)  four decimal places to the right of the decimal point |
| He worked there for five years and nine months. | 9 months ÷ 12 months (or 3 ÷ 4) = | 5.75 | No tens, but five units, so one place to the left of the decimal point, plus three decimal places to the right of the decimal point |
| The manager knew that Sanchez had 352 hits during 1217 times at bat. | 352 ÷ 1217 | .289 | Batting averages are three-digit decimals, with no places to the left of the decimal point because any number greater than 1.0 would mean more hits than at- bats, which is impossible. |

# 1.3 Decimal Operations (+, ÷)

Correct any errors in the table

* Daily Sales
* Total Weekly Sales
* Average Daily Sales

# Example:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **The Campus Closet Shop -** Threads & Sportswear | | | | | | | | | |
| **Daily Sales** | **M** | **T** | **W** | **Th** | **F** | **S** | **S** | **Total Weekly Sales $** | **Average Daily Sales $** |
| Ball caps | 15.50 | 25.95 | 14.75 | 7.93 | 12.77 | 19.28 | 27.54 | $123.72 | $17.68 |
| Scarves | 20.00 | 31.75 | 16.81 | 7.00 | 21.66 | 20.98 | 14.15 | $132.35 | ~~$40.05~~  $18.91 |
| **Total Day Sales $** | 35.50 | ~~31.74~~  57.70 | 31.56 | ~~20.03~~  14.93 | 34.43 | 40.26 | ~~37.56~~  41.69 | ~~$476.73~~  $256.07 | ~~$68.10~~  $36.58 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Week 2 The Campus Closet Shop -** Threads & Sportswear | | | | | | | | | |
| **Daily Sales** | **M** | **T** | **W** | **Th** | **F** | **S** | **S** | **Total Weekly Sales** | **Average Daily Sales** |
| school-emblem  T-shirts | 5.50 | 15.95 | 24.75 | 67.93 | 120.77 | 219.28 | 134.13 | ~~121.34~~  588.31 | 84.04 |
| school-emblem sweatshirts | 16.74 | 32.47 | 45.21 | 37.88 | 187.35 | 94.22 | 54.93 | 468.80 | ~~105.07~~  66.97 |
| school-emblem  jackets | 45.65 | 91.30 | 182.60 | 136.50 | 182.60 | 273.90 | 45.65 | ~~2765.01~~  958.20 | ~~395.00~~  136.89 |
| **Total Day Sales** | 67.89 | ~~450.16~~  139.72 | 252.56 | ~~199.68~~  242.31 | ~~997.31~~  490.72 | 587.40 | 234.71 | 2015.31 | 287.90 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Bob’s Bagels and Bakery** | | | | | | | | | |
| **Daily Unit Sales** | **M** | **T** | **W** | **Th** | **F** | **S** | **S** | **Total Weekly Sales** | **Average Daily Sales** |
| plain  bagels | 35.45 | 38.45 | 33.25 | 32.15 | 38.65 | 21.05 | 28.85 | 227.85 | 32.55 |
| cheese  bagels | 15.44 | 22.10 | 11.85 | 14.50 | 19.25 | 9.45 | 15.10 | ~~200.09~~  107.69 | ~~28.58~~  15.38 |
| raisin-wheat bagels | 10.35 | 11.95 | 17.90 | 14.45 | 19.20 | 11.35 | 10.10 | ~~176.98~~  95.30 | 13.61 |
| **Total Day Sales** | 61.24 | ~~22.13~~  72.50 | 63.00 | ~~145.87~~  61.10 | 77.10 | ~~51.85~~  41.85 | 54.05 | 430.84 | 61.55 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Music, Movies and More** | | | | | | | | | |
| **Daily Unit Sales** | **M** | **T** | **W** | **Th** | **F** | **S** | **S** | **Total Weekly Sales** | **Average Daily Sales** |
| single  CD’s | 50.25 | 82.60 | 24.35 | 120.36 | 175.23 | 217 | 190 | 766.16 | ~~109.40~~  109.45 |
| CD  collections | 110.24 | 0 | 59.95 | 220.36 | 239.56 | 310.38 | 49.33 | 989.82 | 141.40 |
| DVD’s | 31.45 | 97.10 | 87.11 | 118.35 | 167.99 | 258.34 | 120.02 | 880.26 | 125.75 |
| **Total Day Sales** | 191.94 | 179.70 | 171.41 | ~~458.97~~  459.07 | 582.78 | 771.69 | 279.75 | 2636.24 | ~~376.61~~  ~~376.60~~ |

**Extras for Experts:** Why would knowing average dollar sales per day be useful to a store manager?

e.g. It would have the same benefit as knowing average unit sales per day. S/he would know which days are busiest so could plan for more inventory, more staff or longer hours.

# 1.4 Decimal Operations (X, ÷)

**Example:** Sales tax is calculatedat the rate of 0.065. Find the sales tax on these items:

* a pen at $0.69 $0.69 X .065 = $0.04485 **Rounded to $0.05**
* a pack of blank CDs at $19.95 $19.95 X .065 = $1.29675 **Rounded to $1.30**
* an ink cartridge at $24.17 $24.17 X .065 = $1.57105 **Rounded to $1.57**

**1.** A portion of the gross profit of every item sold in a store helps to pay for fixed overhead costs. Correct the errors in the following table. There are at least three. Do **not** round your answers.

|  |  |  |  |
| --- | --- | --- | --- |
| **Allocated Portion of Total Fixed**  **Overhead Cost (expressed as a decimal)** |  | **Actual Gross Profit**  **per Item Sold** | **Actual Contribution to Fixed Overhead Costs** |
| .025 | of | $0.20 | ~~.0252~~ .005 |
| .075 | of or X | .60 | ~~.80~~ .045 |
| .015 | X | .50 | .0075 |
| .005 | X | .66 | ~~1.1~~  .0033 |
| .075 | X | .80 | .06 |
| .011 | X | .35 | .00385 |
| .025 | X | .25 | .00625 |
| .0273 | X | .48 | ~~.7~~ .013 |
| .0151 | X | 6.33 | .095583 |

**2.** Complete the table that shows the sales tax calculations on several purchases at several different tax rates. Do **not** round your answers.

|  |  |  |  |
| --- | --- | --- | --- |
| **Purchase Amount** |  | **Sales Tax Rate** | **Sales Tax Amount** |
| $115.26 | X | 3 ½% .035 | $4.0341 |
| $ 22.95 | X | 6% .06 | $1.377 |
| $4,298.10 | X | 5 ½% .055 | $236.3955 |
| $5.01 | X | 7%. .07 | $0.3507 |
| $271.11 | X | 6 ½% .065 | $17.62215 |
| $2.44 | X | 8 ¼% .0825 | $0.2013 |
| $904,345.01 | X | 4% .04 | $36,173.80 |
| $0.99 | X | 3 1/2% .035 | $0.03465 |
| $231.67 | X | 2% .02 | $4.6334 |
| $32.05 | X | 5% .05 | $1.6025 |

**Extras for Experts**

* Rachel’s tips as a server are usually between one fifth (20%) and one tenth (10%) of the total cost of the meals she serves. **Without** using a calculator, estimate to the nearest $0.50 a reasonable amount for each night’s total tips?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Total Value of**  **Meals Served** | **Estimated Tips**  **at one tenth** | **Estimated Tips**  **at one fifth** | **Most Likely Estimate** |
| **Day Worked** |  |  |  |  |
| Monday | $110.00 | $11.00 | $22.00 | $16.50 |
| Thursday | $175.45 | $17.50 | $35.00 | $26.00 |
| Friday | $274.98 | $27.50 | $55.00 | $41.00 |
| Saturday | $333.21 | $33.00 | $66.00 | $50.00 |
| Sunday | $189.37 | $19.00 | $38.00 | $28.00 |

* A customer in the restaurant visiting from Canada left Rachel a $20.00 tip in Canadian dollars. What was its value in American dollars, if one American dollar is worth 1.14 Canadian dollars?

Divide, so $US17.54

# 1.5 Understanding Fractions

# Write a fraction that describes the shaded part or shaded sections of each whole or group.

# Example:

# Think: 5 of 10 parts are shaded, so 5/10 of the total is shaded. A simpler fraction that means the same as 5/10 is ½ because both parts of the fraction can be divided evenly by the same number.

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

**1.** \_\_4/5\_\_\_

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

**2.** \_\_1/4\_\_\_

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

**3.** \_2/3\_\_\_\_

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

**4.** \_\_8/10\_\_\_ or \_\_4/5\_\_\_

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

**5.** \_3/10\_\_\_\_

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

**6.** \_\_3/4\_\_\_\_

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

**7.** \_1/5\_\_\_\_\_ **8.** \_1/5\_\_\_\_\_\_

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

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

**9.** \_\_2/5\_\_\_\_\_ **10.** \_1/3\_\_\_\_\_

@ @ @ @ @ @ @ @ @ @ $ $ $ $ $ $ $ $ $ $ $

@ @ @ @ @ @ @ $ $ $ $ $ $ $ $ $ $ $

@ @ @ @ @ @ @ @ $ $ $ $ $ $ $ $ $ $ $

**Extras for Experts**

**11.** \_\_1 5/8\_\_\_\_\_

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

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

**12.** \_\_2 1/5\_\_\_\_

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

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

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

**1.6 Thinking about Parts of Parts**

**Example:**

Is one half of one quarter of a room larger or smaller than one half of a room?

**A. Prove it by picturing it.**

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

**Think:** **If the shaded**

**part = one quarter...**

-------------------------------------------------------- or...

**1/2 of ¼ is smaller than 1/4.**

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

**--------------------------------------------------**

**B. Prove it by doing the math:**

i) Compare fractions.

**Think: ¼ = 2/8 and ½ of ¼ = 1/8**

2/8 is larger than 1/8.

So ½ of ¼ is smaller than ¼.

or...

ii) Convert both numbers to decimals.

**Think: ½ = .5** (or 5/10) **and 1/4 is .25** (or 25/100)

Multiply .5 X .25 **.25**

Count the decimal places in the numbers multiplied. **X .5**

Check that the answer has the right number of decimal places. **.125**

Check by dividing: .125 ÷ .5 = .25

.125 is smaller than .25

So, ½ of ¼ is smaller than ¼.

------------------------------------------------------------------------------------------------------------

**1.** Is 3/10 of a sheet of paper smaller than 1/5 of a sheet of paper? Show it by folding a sheet of paper, then prove it using math by converting the fractions to decimals.

No, 3/10 is larger because, for example, .3/10 is larger than 2/10 (1/5 = 2/10); or .3 is larger than .2.

**2.** Is ½ of inventory smaller than ¾ of inventory? Prove it.

Yes, ½ is smaller because, for example, 4/8 is smaller than 6/8; or .5 is smaller than .75.

**3.** Is 1/5 larger than ¼? Prove it.

No, because, for example, 4/20 (1/5 = 4/20) is smaller than 5/20 (1/4 = 5/20); or .2 is smaller than .25.

**4.** Is 3/10 larger than 1/3? Prove it.

No, for example, because .3 is smaller than .333; or 30/100 is smaller then

33 1/3 /100.

**Extras for Experts**

**5.** Is 1/3 of your salary more than ½? Prove it.

Yes, for example, because .333 (1/3 = .333) is more than .5; or 33 1/3 /100 is less than 50/100.

**6.** What would you rather have: one half of a pizza or two-thirds of a pizza?

One half because, for example, .5 is smaller than .666 (2/3 = .666); or 50/100 is smaller then 6661/6 /1000.

**7.** Is one third of your staff more or less than one quarter of your staff?

One third is more because .333 is more than .25; or 33 1/3 /100 is more than 25/100.

**8.** Are one and a half cartons of printing paper more or less than one half of a carton plus another three quarters of a carton?

One and one half cartons is more because, for example, 6/4 (1 ½ = 6/4) is more than ½ plus ¾ (2/4 plus ¾); or 1.5 is more than 1.25 (.5 + .75 = 1.25).

# 1.7 Equivalent Fractions

**Example 1:** Which figures show equivalent fractions?

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

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

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

4/8 = **1/2**

5/10 = **1/2**

2/4 = **1/2**

**Think: Is 4/8 in simplest terms?**

**Think: No, I can divide each part evenly by 4 to get 1/2.**

**Repeat with the other two figures.**

**So, all three figures show the same equivalent fraction of 1/2.**

**Example 2:** Reducecommon fractions to simplest terms to compare them.

|  |  |  |
| --- | --- | --- |
| 9/12 | **Divide both parts by 3.** | = 3/4 |
| 75/100 | **Divide both parts by 25.** | = 3/4 |
| 6/8 | **Divide both parts by 2.** | = 3/4 |

**Think: what is the largest number that can be divided evenly into both parts of the fraction? (i.e. the lowest common multiple or LCM)**

Many frequently used fractions are equivalent fractions. Learn them, but also know how to find equivalent fractions. Complete the charts.

|  |  |  |
| --- | --- | --- |
| **Some Frequently Used Fractions** | **Lowest Common Multiple**  **(the largest whole number that can be divided evenly into both parts of the fraction)** | **Simplest**  **Equivalent**  **Fraction** |

|  |  |  |
| --- | --- | --- |
| 3/9 | 3 | 1/3 |
| 4/12 | 4 | 1/3 |
| 2/4 | 2 | 1/2 |
| 3/6 | 3 | 1/2 |
| 9/12 | 3 | 3/4 |
| 5/15 | 5 | 1/3 |
| 3/12 | 3 | 1/4 |
| 12/16 | 4 | 3/4 |
| 5/10 | 5 | 1/2 |
| 15/20 | 5 | 3/4 |
| 3/15 | 3 | 1/5 |

**Shade answers**

|  |  |  |
| --- | --- | --- |
| **Some Everyday**  **Fractions** | **Lowest**  **Common**  **Multiple** | **Simplest Equivalent**  **Fraction** |
| 4/6 | 2 | 2/3 |
| 2/10 | 2 | 1/5 |
| 2/16 | 2 | 1/8 |
| 33 ⅓ /100 | 33⅓ | 1/3 |
| 10/100 | 10 | 1/10 |
| 25/100 | 25 | 1/4 |
| 50/100 | 50 | 50 |
| 75/100 | 25 | 3/4 |
| 20/100 | 20 | 1/5 |

**Extras for Experts**

* Odell bakes cookies to sell in gift baskets. He reduces every cookie recipe he uses by 1/8 of a cup of sugar to make his product less fattening. How much sugar would he use in recipes that normally call for:

¾ cup of sugar per dozen 5/8 1½ cups of sugar per dozen 1 3/8 2/3 cup of sugar 13/24 2.25 cups of sugar 2.125 or 2 1/8

# 1.8 Percentage

**Example:** Percentage means “out of one hundred.”

12 of 50 T-shirts in stock are Extra Large. What percentage is that?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Whole or Total** | **Part** | **Think:** | **Calculate**  **for 100:** | **Part Expressed as a Percentage** |
| Total of 50 T-shirts in stock | 12 are  Extra-Large | **12 out of 50 or 12/50 or**  **12 ÷ 50 = .24** | 100 X .24 = 24% | 24% of the T-shirts are Extra-Large |

Complete the chart.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Poppa Pete’s Pizza-Plus Restaurant | | | | | |
|  | **Total Sold** | **Sales by Type of Pizza** | **Think:** | **Calculate:** | **Part Expressed as a Percentage** |
| 1. | 100 pizzas | 12 Vegetarian | **12/100**  **= .12** | **100 X .12** | 12%of pizzas sold were Vegetarian |
| 2. | 100 pizzas | 22 Pepperoni & Peppers | **22/100 = .22** | **100 x .22** | 22% of pizzas sold were Pepperoni & Peppers |
| 3. | 100 pizzas | 2 Anchovies & Tomatoes | **2/100 = .02** | **100 x .02** | 2% of pizzas sold were Anchovies & Tomatoes |
| 4. | 50 pizzas | 17 House Special | **17/50**  **= .24** | **100 x .24** | 24% of pizzas sold were House Specials |
| 5. | 50 pizzas | 4 Sauce & Cheese Only | **4/50 =.08** | **100 x .08** | 8% of pizzas sold were Sauce & Cheese Only |
| 6. | 105 pizzas | 21 Just Meat Special | **21/105 = .20** | **100 x .20** | 20% of pizzas sold were Just Meat Specials |
| 7. | 210 pizzas | 42 Just Meat Special | **42/210 = .20** | **100 x .20** | 20% of pizzas sold were Just Meat Special |
| 8. | 24 pizzas | 8 Pineapple, Extra Cheese & Ham | **8/24 = .33** | **100 x .33** | 33% of pizzas sold were Extra Cheese & Ham |
| 9. | 35 pizzas | 8 Peppers, Sausage & Mushroom | **8/30**  **= .22857 = .23** | **100 x .23** | 23% of pizzas sold were Peppers, Sausage & Mushroom |
| 10. | 45 pizzas | 7 Cinnamon Dessert Pizzas | **7/45 = .16** | **100 x .16** | 16% of pizzas sold were Cinnamon Dessert Pizzas |

**Extras for Experts**

A host/cashier, two waiters, and three helpers at Poppa Pete’s share the total tips left by customers by percentage. Every night the total amount of tips collected changes, but each type of worker still gets the same percentage share: host/cashier – 30%; each waiter – 20%.

**a.** What percentage does each helper get?

10%; three helpers divide the remaining 30%

**b.** If $240.00 in total tips were collected on Friday night, how much money did each worker receive as his or her share?

host/cashier = $72; each waiter = $48; each helper = $24

**c.** How would you change the share percentages if there were four waiters instead of three?

Answers will vary.

# 1.9 Ratio

Ratios compare one number, quantity, or amount to another.

# Example 1: bracelets sold = 4 necklaces sold = 3

So, the ratio of bracelets sold to necklaces sold is 4/3 or 4:3.

**Think: Keep the order of the** **numbers in the ratio the same as the order of the items being compared. 4:3 is not the same ratio as 3:4**

**Example 2:** caps sold = 24 visors sold = 16

. The ratio of caps sold to visors sold is 24:16 or 3:2

**Think:** **Divide both numbers (24 and 16) by 8, to get 3:2, so the ratio of 24:16 is the same ratio as 3:2. Express ratios, like fractions, in the simplest terms.**

Complete the chart. The first line is done for you.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Rosa’s Really Cool Stuff Store Daily Sales for:** Monday, October 12 | | | | | |
|  | **Item** | **Number**  **Sold** | **Item** | **Number**  **Sold** | **Expressed as a Ratio** |
| **1.** | Caps | 6 | Visors | 5 | Caps:Visors = 6:5 |
| **2.** | Gloves | 4 | Mitts | 1 | Gloves:Mitts = 4:1 |
| **3.** | Posters | 2 | Calendars | 3 | Posters:Calendars = 2:3 |
| **4.** | T-shirts | 7 | Hoodies | 5 | T’s:Hoodies = 7:5 |
| **5.** | Short-sleeve T’s | 6 | Long-sleeve T’s | 3 | **Think: Simplest terms.**  Short:Long = 2:1 |
| **6.** | Men’s Jeans | 2 | Women’s Jeans | 6 | Men’s:Women’s = 1:3 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Item** | **Number**  **Sold** | **Item** | **Number**  **Sold** | **Expressed as a Ratio** |
| **7.** | Picture Frames | 12 | Picture Cubes | 8 | Frames:Cubes = 3:2 |
| **8.** | Beads | 24 | Bead strings | 1 | Beads:Strings = 24:1 |
| **9.** | Cologne | 5 | Perfume | 6 | Cologne:Perfume = 5:6 |
| **10.** | Scarves | 3 | Ties | 1 | Ties: Scarves = 1:3 |

**Extras for Experts**

**11.** Rosa has 75% of her investment portfolio in stocks, one fifth in bonds, and the rest in cash. Write a ratio to describe her investment portfolio.

75:20:5 or 15:4:1

**12.** Rosa’s business Rosa usually sells about 1 size Small (S) shirt for every 2 Medium (M) and every 3 Large (L) shirts she sells. If her actual sales of L this month are 24 shirts, about how many M and S shirts did she probably sell?

The normal ratio is S:M:L = 1:2:3. If she sold 24 L, she could expect to sell about 16 M and 8 S. 8:16:24 is a ratio equivalent to 1:2:3.

# 1.10 Converting among Fractions, Decimals, and Percents

**Example:**

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

Express the shaded area or parts

of the total floor plan diagram as a

* common fraction **37/100**
* decimal **37/100 = 0.37**

**Hint: 37 ÷ 100**

* percentage **37 out of 100 =** **37%**

------------------------------------------------------------------------------------------------------------

Complete the charts as shown. Write fractions in their simplest form.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Common**  **Fraction** | **Decimal** | **Percentage** |
| **11** | 4/5 | .8 | 80% |
| **12** | 3/10 | .3 | 30% |
| **13** | 1/100 | .01 | 1% |
| **14** | 2/5 | .4 | 40% |
| **15** | 9/10 | .9 | 90% |
| **16** | 99/100 | .99 | 99% |
| **17** | 5/8 | .625 | 62.5% |
| **18** | 1/1000 | .001 | 0.1% |
| **19** | 1½ | 1.5 | 150% |
| **20** | 1⅛ | 1.125 | 112.5% |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Common**  **Fraction** | **Decimal** | **Percentage** |
| **1** | 1/10 | .1 | **10%** |
| **2** | 3/4 | **.75** | 75% |
| **3** | 1/2 | .5 | 50% |
| **4** | 1/3 | .33333 | 33.3% |
| **5** | 7/10 | .7 | 70% |
| **6** | 1/4 | .25 | 25% |
| **7** | 3/8 | .375 | 37.5% |
| **8** | 3/5 | .6 | 60% |
| **9** | 2/3 | .66666 | 66.67% |
| **10** | 1/8 | .125 | 12.5% |

**Extras for Experts**

|  |  |  |
| --- | --- | --- |
| **Original**  **Business**  **Data** | **Change** | **New Data** |
| $23,125 in yearly net profit | 10% increase | $25,437.50 |
| 150 employees | 1/5 cutback in staff | 120 employees |
| $71,200 in annual sales | 50% increase | $106,800 |
| $71,200 in annual sales | 150% increase | $178,000 |
| 451 of 475 phone calls  answered in 15 seconds or less | 2% improvement in number of calls answered in 15 seconds or less | 97% of calls answered in 15 seconds or less |
| 3/50 of all purchases returned for refund | 2% fewer returns | 4%“stick rate” for purchases |

# Math Skills for Entrepreneurs

# 1.11 Using Formulas

Formulas are shortcuts that help you solve similar types of problems quickly and easily.

**Example:** To decide how many hamburger patties to buy for a birthday cookout, Charmayne used a method her mom taught her:

**1.5 hamburgers X number of people expected.**

So, if 4 people are expected, she should buy 1.5 X 4 = 6. If 10 people are expected, she should buy 1.5 X 10 = 15, and so on.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **To Find...** | **Use This Formula** | **Sample Data** | **Put Your Data in the Formula and Do the Math** | **Get the Answer** |
| Perimeter of any rectangular shape or room | (l +w)2  **(length + width) X 2** | Office length 12 ft.  Office width 10.5 ft. | (12 + 10.5) X 2  **Remember to do any operation inside brackets first.**  = (22.5) X 2 = | 45 ft. |
| Simple interest earned | P X r  **principal X interest rate %** | Principal $1,037  Interest rate: 3% | $1,037 X 3% =  $1,037 X .03 = | $31.11 |
| Area of a square or rectangle | l X w  **length X width** | Shop length 43 ft.  Shop width 22 ft. | 43 X 22 = | 946 sq. feet |
| Rule of 72: Years for an Investment to Double | **72 ÷ Growth Rate %** | Growth Rate 9% | 72 **÷** 9% = | 8 years |

Use the formulas to complete the following chart.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Need to find** | **Facts Given** | **Formula to Use** | **Answer** |
| **1** | distance around a  property | L = 150 ft.  W = 75 | Perimeter of a rectangle | 450 ft. |
| **2** | years to double savings | 6% interest rate | Rule of 72 | 12 yrs. |
| **3** | square footage of an office carpet | L = 12 ft.  W = 11 ft. | Area of a rectangle | 132 sq. ft. |
| **4** | interest earned per year | Principal = $250  Interest rate 3% | Simple Interest formula | $7.50 |
| **5** | floor space in a trade fair booth | L = 20  W = 15 | Area of a rectangle | 300 sq. ft. |
| **6** | fencing needed for small dog pen | L = 15  W = 22 | Perimeter | 74 ft. |
| **7** | years to double the value of a savings bond | 4.5% interest | Rule of 72 | 16 |
| **8** | no. of sq. feet of film needed to solar tint a store window | L = 42 in.  W = 24 in. | Area of a rectangle | 1008 sq. in. |
| **9** | years to double cash savings | 5% interest rate | Rule of 72 | 14.4 |
| **10** | interest earned per year | Principal = $525  Interest rate 2.5% | Simple Interest formula | $13.13 |

**Extras for Experts**

**11.** What would be the formula to use for finding the area of a triangular garden? **Hint: Draw a rectangle. Divide it to make two equal triangles.** **What do you notice?**

½ (base X height)

**12.** Write a formula to use for calculating the price of carpeting at $30/sq. foot to cover a floor area of 11 ft. X 14 ft.

$30 (11 X 14)

**13.** Then write a formula for calculating the price of carpeting *any* floor area.

$30 X (LXW)

**Math Skills for Entrepreneurs**

# 1.12 Bar Graphs

Bar graphs help you picture and compare different quantities or amounts.

**Example:** The bar graph shows each day’s sales for one week for Webster’s pet grooming business.

|  |  |
| --- | --- |
| M | $20.00 |
| T | $40.00 |
| W | $100.00 |
| Th | $80.00 |
| F | $110.00 |
| Sat | $60.00 |
| Sun | CLOSED |



**1.** Which day had the highest sales?

Friday $120

**2.** Which day had the lowest sales?

Sunday $0; or Monday $20 (if you count only business days)

**3.** How is the graph labeled horizontally?

Days

**4.** How is the graph labeled vertically?

$ Sales

**5.** Use the data in the graph to complete the table above at left. List each day’s sales.

**6.** What were Webster’s average daily sales for days he was open? $68.33

**7.** The following week, Webster had daily sales of M - $15; T - $45; W - $30;

Th - $60; F - $90; Sat. - $75; and Sun. - $0. Draw a bar graph to show that week’s daily sales.

**Extras for Experts**

**8.** How could Webster change the bar graph to show each day’s sales of cats groomed compared to dogs groomed? Color code the existing bars to show how much of each day’s sales were for each kind of pet; or use two bars for each day; one for each type of pet.

**Math Skills for Entrepreneurs**

# 1.13 Line Graphs

Line graphs help show how something has changed, usually by time.

**Example:** The graph on the right shows how Rico’s sales in his gift shop change each month for half a year.

|  |  |
| --- | --- |
| Jan | Nearly $200 |
| Feb | Nearly $500 |
| Mar | Nearly $600 |
| Apr | Nearly $1100 |
| May | Nearly $400 |
| June | Under $100 |

**1.** Which month had the highest sales? April

**2.** Which month had the lowest sales? June

**3.** How is the graph labeled horizontally? Months

**4.** How is the graph labeled vertically? $ Sales

**5.** Use the data in the graph to complete the table above on the left above. List each month’s approximate sales (to the nearest $100).

**6.** During the second half of the year, Rico’s monthly sales were

July – under $100 Oct. – nearly $600

Aug. – under $100 Nov. – nearly $1000

Sept. – under $200 Dec. – nearly $1200

Draw a line graph to show Rico’s monthly sales.

**Extras for Experts**

**7.** In what three months are Rico’s sales highest?

Dec., Apr., Nov.

**8.** What might explain this pattern?

Lots of gift purchases before the winter holiday season and around Easter/Passover in the spring

**9.** If December sales are nearly $1200, but are up 10 percent from the previous year, what might the next month’s sales be?

If the pattern holds, Jan. sales would be nearly $220 (last year, plus 10%)

# Math Skills for Entrepreneurs

# 1.14 Pie Charts

Pie charts show how the parts of a whole amount or quantity compare to one another and to the whole.

**Example:** The graph below shows the proportions of the ingredients for the pizza recipe at Wanda’s Italian restaurant, *Chow, Baby*.

1. Which ingredient is the greatest by volume? Crust\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Which ingredient is the lowest by volume? \_\_\_\_\_\_Mushrooms\_\_\_\_\_\_\_\_\_

3. What percentage of the total does tomato sauce represent? \_12.5%\_\_\_\_\_

4. What is the total of all percentages? 100%\_\_\_\_\_\_

**5.** Redraw the pie chart for a Hawaiian pizza. Replace pepperoni with ham and mushrooms with pineapple.

Only the ingredients list in the key and the pie chart title change

**6.** Create a pie chart to show the types of investments in Wanda’s investment portfolio: cash – 10%; stocks – 25%; bonds – 15%; mutual funds – 50%.

Chart segments: ½ for mutual funds; ¼ for stocks; 2/5 of that quarter would be for cash and 3/5 for bonds

**Extras for Experts**

**7.** Create a pie chart to compare the monthly fixed operating costs in Wanda’s business: utilities - $1000.00; salaries - $3000.00; advertising - $ $2000.00; interest - $ 1000.00; insurance - $1000; rent - $1000.00; and depreciation - $1000.00.

Chart segments should be 10% (36 degrees) each for utilities, interest, insurance, rent and depreciation; 30% (108 degrees) for salaries; and 20% (72 degrees) for advertising. Total 100% = 360 degrees.

**8.** If the pepperoni/mushroom pizza shown above was ordered with double mushrooms, would the percentage for mushrooms then be 10%? Why?

No, the overall proportions (and therefore the percentages) would all change.

# Mathematics and Business Math Quizzes for Entrepreneurs

# PART 2

# Business Math Skills for Entrepreneurs

# 2.1 Cost of Goods Sold (COGS)

**2.2 Gross Profit (GP)**

**2.3 Income Statements**

**2.4 Return on Investment (ROI)**

# Business Math Skills for Entrepreneurs

**2.1 Cost of Goods Sold (COGS)**

**Example:** The cost of goods (or services) sold can be thought of as the cost of selling “one additional unit.” Find theCost of Goods Sold (COGS) for one complete leather jacket:

1. calculate the cost of each type of material used to make one jacket
2. then, add those costs to calculate the total COGS of one jacket.

|  |  |  |  |
| --- | --- | --- | --- |
| **Needed to Make One Jacket** | **Unit Cost of Material** | **Calculation** | **Cost**  **of Material** |
| 3 yards of leather | $10.00 per yard | **Think, 3 yards are needed, and one yard costs $10.00, so...**  3 X 10 = | $30.00 |
| 3 yards of Thinsulate® | $8.00 per yard | 3 X 8 = | $24.00 |
| 3 yards of nylon | $4.00 per yard | 3 X 4 = | $12.00 |
| 1 zipper | $129.60 per gross  (1 gross = 12 dozen) | **Think: 12 X 12 = 144, so...** 129.60 ÷ 144 = | $ 0.90 |
| Thread | $0.25 | $0.25 X 1 = | $ 0.25 |
| **Total Cost of Goods Sold for One Complete Jacket** | | | **$67.15** |

**Try It:** The Cost of Goods Sold (COGS) for One Beaded Necklace

|  |  |  |  |
| --- | --- | --- | --- |
| **Needed to Make**  **One Necklace** | **Unit Cost of Material** | **Calculation** | **Cost of**  **Material** |
| 12 coral beads | $3.60 per dozen | $3.60 = |  |
| 1 clasp | $2.40 per dozen | $2.40 ÷ 12 = |  |
| 12 gold beads | $0.50 each | 12 X .50 = | $6.00 |
| \_6\_ turquoise beads | $1.00 each | 6 X $1.00 = | $6.00 |
| \_18\_ inches nylon string | $0.02 per yard | .01/.02 = ½  36 inches (1 yard) ÷ 2 = 18 inches. | $0.01 |
| **Total Cost of Goods Sold for One Beaded Necklace** | | |  |

Provide the missing information to complete each chart.

**1. The Cost of Goods Sold (COGS) for One Sling Bag**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost** | **Calculation** | **Cost of Material** |
| ¾ yard floral chintz fabric | $12.00 per yard | **12 x ¾ =** | **$ 9.00** |
| ¾ yard lining material | $4.00 per yard | **4 x ¾ =** | **3.00** |
| Thread | $0.75 | **.75 x 1 =** | **.75** |
| **Total Cost of Goods Sold** | | | **$12.75** |

**2.** **The Cost of Goods Sold (COGS) for One Baby’s Bib**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost** | **Calculation** | **Cost of Material** |
| ¼ yard terry cloth material | $8.00 per yard | 8 ÷ 4 = | $2.00 |
| 1 yard binding | $0.50 per yard | .5 x 1 = | .50 |
| 1 duck emblem | $0.25 | .25 x 1 = | .25 |
| **Total Cost of Goods Sold** | | | **$2.75** |

**3. The Cost of Goods Sold (COGS) for One Tie-Dyed T-Shirt**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Cost of Material** |
| 1 cotton T-shirt | $432.00 per gross  (1 gross = 144) | 432 ÷ 144 = | $3.00 |
| ¼ oz. blue dye | $4.00 per oz. | 4 ÷ 4 = | 1.00 |
| ¼ oz. green dye | $4.00 per oz. | 4 ÷ 4 = | 1.00 |
| ¼ oz purple dye | $4.00 per oz. | 4 ÷ 4 = | 1.00 |
| 1/8 cup soda ash | $1.60 per cup | 1.6 ÷ 8 | .20 |
| 15 rubber bands | $0.01 each | .01 x 15 = | .15 |
| **Total Cost of Goods Sold** | | | **$6.35** |

**4. The Cost of Goods Sold (COGS) for a Hair Scrunchy**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 1 elastic band | $2.40 per dozen | 2.4 ÷ 12 = | $.20 |
| 1 silk daisy | $4.80 per dozen | 4.8 ÷ 12 = | .40 |
| 2 silk leaves | $0.08 each | .08 x 2 = | .16 |
| thread | $0.20 | .2 x 1 = | .20 |
| **Total Cost of Goods Sold** | | | **$.96** |

**5. The Cost of Goods Sold (COGS) for a Quartz Clock**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 1 quartz clock movement | $575.00 for 50 | 575 ÷ 50 = | $11.50 |
| 1 pre-cut clock case, paint, and numerals | $225.50 for 50 | 225.5 ÷ 50 = | 4.51 |
| **Total Cost of Goods Sold** | | | **$16.01** |

**6. The Cost of Goods Sold (COGS) for a Customized Jump Rope**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 4 feet of clothesline | $0.02 per foot | .02 x 4 = | $ .08 |
| 2 smokestack peg handles | $0.35 each | .35 x 2 = | .70 |
| ½ oz. pink oil paint | $13.00 per 8 oz. | 13 ÷ 8 ÷ 2 = | .81 |
| ½ oz. white oil paint | $13.00 per 8 oz. | 13 ÷ 8 ÷ 2 = | .81 |
| **Total Cost of Goods Sold** | | | **$2.40** |

**7. The COGS for an Apple-Shaped Candle**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 16 oz. paraffin | $14.08 for 10 Ib.  (1 lb = 16 oz.) | 14 ÷ 10 = | $1.40 |
| ½ oz. red color cake | $1.71 per ½ oz. | 1.71 x 1 = | 1.71 |
| 4 inches cotton wicking | $.005 per inch | .005 x 4 = | .02 |
| 1 plastic apple | $4.00 per bag of 10 | 4 ÷ 10 = | .40 |
| ½ oz. styrene | $0.14 per oz. | .14 ÷ 2 = | .07 |
| **Total Cost of Goods Sold** | | | **$3.60** |

**8. The COGS for a Seed-Starter Tray**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 3 biodegradable seed pots | $0.14 each | .14 x 3 = | $ .42 |
| 12 basil seeds | $0.05 each | .05 x 12 | .60 |
| 16 oz. soil  (1 pound = 16 oz.) | $16.95 for 50 pounds | 16.95 ÷ 50 = | .34 |
| 8 feet wooden slatting  for tray | $0.20 per foot | .2 x 8 = | 1.60 |
| hot glue | $0.50 | .5 x 1 = | .50 |
| 1 yard of ribbon | $5.75 per 100 yards | 5.75 ÷ 100 = | .06 |
| 1 hand-printed label | $0.10 | .1 x 1 = | .10 |
| **Total Cost of Goods Sold** | | | **$3.08** |

**9. The COGS for a Sea Shell Picture Frame**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 1 wooden 5” x 7” frame | $36.00 per dozen | 36 ÷ 12 = | $3.00 |
| 20 assorted sea shells | $0.25 each | .25 x 20 = | 5.00 |
| hot glue | $1.00 | 1 x 1 | 1.00 |
| **Total Cost of Goods Sold** | | | **$9.00** |

**10. The COGS for a Wooden Bird Feeder**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 2 feet of plywood | $3.00 per foot | 3 x 2 = | $6.00 |
| hot glue | $ 1.00 | 1 x 1 = | 1.00 |
| nails | $0.25 | .25 x 1 = | .25 |
| paint | $1.00 | 1 x 1 = | 1.00 |
| 1 fixture for hanging | $1.99 for 20 | 1.99 ÷ 20 = | .10 |
| **Total Cost of Goods Sold** | | | **$8.35** |

**11. The COGS for Dupe of a Demo Tape**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 1 audio cassette and  plastic case | $750.00 for case  of 250 | 750 ÷ 250 = | $ 3.00 |
| I hour engineer's time | $40.00 per hour | 40 x 1 = | 40.00 |
| 1 label | $54.00 per 1000 | 54 ÷ 1000 = | .05 |
| **Total Cost of Goods Sold** | | | **$43.05** |

**12. The COGS for one square of *Rice Krispies® Treat***(Note: This recipe makes 12 three-inch square Rice Krispies® Treats. Find the COGS for *one* square.)

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 10 oz. marshmallows | $1.99 for 10 oz. bag | 1.99 x 1 = | $1.99 |
| 6 cups Rice Krispies® | $0.18 per cup | .18 x 6 = | 1.08 |
| 3 tablespoons margarine | $0.03 per tablespoon | .03 x 3 = | .09 |
| **Total Cost of Goods Sold** | | | **$3.16** |

**13. The COGS for one Hand Printed Greeting Card**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 1 ready-cut blank  white vellum card | $21.60 per gross  (1 gross = 144) | 21.6 ÷ 144 = | $ .15 |
| 1 hand-cut initial stamp | $1.00 | 1 x 1 = | 1.00 |
| ink | $0.10 | .1 x 1 = | .10 |
| **Total Cost of Goods Sold** | | | **$1.25** |

**14. COGS for a Customized DVD-Case Cover**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 1 plastic DVD case | $25.00 for 25 | 25 ÷ 25 = | $1.00 |
| 1 color photocopy | $1.00 | 1 x 1 = | 1.00 |
| marbleized paper  7” x 9” | $0.69 per 7” x 9” sheet | .69 x 1 = | .69 |
| **Total Cost of Goods Sold** | | | **$2.69** |

**15. COGS for a Wooden Window Box**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 16 feet of slat lumber | $0.20 a foot | .2 x 16 = | $3.20 |
| 1 plastic 9" x 24”  window box liner | $14.75 for 25 | 14.75 ÷ 25 = | .59 |
| glue/nails | $ 1.00 | 1 x 1 = | 1.00 |
| **Total Cost of Goods Sold** | | | **$4.79** |

**16. COGS for one Soft-Shell Crab Sandwich**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 1 soft-shell crab | $27 per dozen | 27 ÷ 12 = | $2.25 |
| 1 oz. cornmeal | $0.03 | .03 x 1 = | .03 |
| 1 sourdough roll | $0.25 | .25 x 1 = | .25 |
| 1/5 tomato (slice) | $0.05 | .05 x 1 = | .05 |
| lettuce leaves | $0.03 | .03 x 1 = | .03 |
| mayonnaise | $0.06 | .06 x 1 = | .06 |
| oil for frying | $0.10 | .1 x 1 = | .10 |
| **Total Cost of Goods Sold** | | | **$2.77** |

**17. COGS for *Black and White Milkshake***

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 1 cup vanilla ice cream | $1.28 per cup | 1.28 x 1 = | $1.28 |
| 1 cup milk | $0.17 per cup | .17 x 1 = | .17 |
| 3 tablespoons chocolate | $0.30 | .3 x 1 = | .30 |
| **Total Cost of Goods Sold** | | | **$1.75** |

**Extras for Experts**

**18. The COGS for one Gift Basket**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| 1 basket | $24.00 per dozen |  |  |
| 2 lb. cheddar cheese |  |  | $3.00 |
| 1 canned ham | $120.00 per dozen |  |  |
| 3 jars of jam |  |  | $3.00 |
| 6 oranges | $2.00 per dozen |  |  |
| 1 box crackers |  |  | $2.00 |
| Cellophane wrap | $0.50 |  |  |
| **Total Cost of Goods Sold** | | |  |

**19. The COGS for one Windsock**

|  |  |  |  |
| --- | --- | --- | --- |
| **Materials Needed** | **Unit Cost of Material** | **Calculation** | **Total Cost of Material** |
| ½ yard rip-stop nylon |  |  | $4.00 |
| 1 team emblem | $3.00 per dozen |  |  |
| Thread |  | 1 X $0.75 |  |
| 1 swivel hardware | $\_\_\_\_ for 24 |  | $0.04 |
| **Total Cost of Goods Sold** | | | **$5.04** |

**20.** Tiago teaches and sells computer training courses. He provides lunch to each person who takes his one-day Internet training class. Create a tasty and healthy lunch menu that would cost Tiago under $4.05 per person in materials. Pick from only the items in the chart. Spend as close to $4.05 without going over as you can.

One tasty and healthy lunch under $4.05 per person would be: lunch bag ($0.025), plate ($0.25), plus napkin (approx. $0.01), bottled water ($0.30) ¼ deli club sandwich ($2.53), apple ($0.55), carrot and celery sticks with Ranch dip ($0.20), plus a bag of pretzels ($0.1663333) = $4.03133 per person.

|  |  |
| --- | --- |
| **Item** | **Cost** |
| apple | $6.60/doz. |
| muffin | $9.00/doz. |
| fresh burrito | $5.50 ea. |
| deli sub sandwich  (each serves 4 people) | $10.10 ea. |
| deli hot dog | $3.15 ea. |
| bag of pretzels | 30 for $4.99 |
| bag of corn chips | 12 for $5.99 |
| banana | $01.79/lb.  (5 bananas) |
| bags of carrot and celery sticks  with Ranch dip | $3.00/lb  (1 lb. serves 15 people) |
| lunch bags | 100 for $2.50 |
| soda | $0.50/can |
| bottled water | $0.30/bottle |
| napkins | 300 for $2.59 |
| paper plates | 25 for $6.25 |

# Business Math Skills for Entrepreneurs

**2.2 Gross Profit**

Gross profit per unit is the selling price per unit **Selling Price per Unit** minus the cost of goods sold (COGS) per unit. **− COGS per Unit**

**Gross Profit per Unit**

Total gross profit is total revenue minus total cost of goods sold. **Total Revenue**

**− Total COGS**

**Total Gross Profit**

**Example:** If the selling price to a consumer for one leather bomber jacket is $250.00 and its cost of goods sold is $67.15, what is the gross profit? **$250.00**

**- 67.15**

The gross profit for the jacket is $182.85. **$182.85**

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Consumer Price** | **COGS** | **Gross Profit** |
| beaded necklace | $25.00 | $15.81 | $9.19 |
| windsock | $10.00 | $5.04 | $4.96 |
| sling bag | $29.95 | $12.75 | $17.20 |
| holiday basket | $60.00 | $16.50 | $43.50 |

**Try It:**

**1.** Determine the gross profit for each of the following items

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Consumer Price** | **COGS** | **Gross Profit** |
| baby bib | $6.95 | $2.75 | $4.20 |
| tie-dyed t-shirt | $12.95 | $6.35 | $6.60 |
| hair scrunchy | $5.00 | $0.96 | $4.04 |
| quartz clock | $39.00 | $16.01 | $22.99 |
| jump rope | $10.00 | $2.40 | $7.60 |
| apple candle | $8.00 | $3.60 | $4.40 |
| seed- starter tray | $12.00 | $3.08 | $8.92 |
| sea shell picture frame | $20.00 | $9.00 | $11.00 |
| wooden bird feeder | $19.00 | $8.35 | $10.65 |

**Extras for Experts**

**2.** Complete the chart. Add any missing information.

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Consumer Price** | **COGS** | **Gross Profit** |
| dupe demo tape | $50.00 | $43.05 | $6.95 |
| Rice Krispies®Treat | $0.50 | $0.26 | $0.24 |
| hand-printed greeting card | $3.00 | $1.25 | $1.75 |
| DVD-case covers | $5.00 | $2.69 | $2.31 |
| wooden window box | $25.00 | $4.79 | $20.21 |
| soft-shell crab sandwich | $12.50 | $2.77 | $9.73 |
| “Black and White” milkshake | $3.69 | $1.75 | $1.94 |

**3.** Determine the gross profit for each of the following services:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Service** | **Amount Charged to Customer** | **Cost of Materials Used** | **Cost of**  **Hired Labor** | **Total COSS**  **(Cost of**  **Services Sold)** | **Gross Profit** |
| 2 hr. of lawn care @ 15.00/hr. | $30.00 | - gas for mower $0.75  - grass seed for bare spots $0.10 | $7.00/hr. | $14.85 | $15.15 |
| 3 hr. of babysitting @ $8.00/hr. | $24.00 | - bus fare $2.00  - snack for children $3.00 | $5.00/hr. | $20.00 | $4.00 |
| 1 hour of dog-walking  @ $5.00/hr. | $5.00 | - dog treats $$0.50 | $3.50/hr. | $4.00 | $1.00 |
| 1.5 hr. of computer repair service  @ $17.50/hr. plus cost of parts | $26.25 | - using own car for 4 mi. @ $0.365/mi.  -$19.95 for new mouse | $12.50/hr | $20.21 | $6.04 |

# Business Math Skills for Entrepreneurs

**2.3 Income Statements**

An income statement summarizes income and expense activity and calculates net profit or loss for a specific period of time.

**Sales (A)**

**− Total Variable Costs** (B1 Cost of Goods Sold + B2 Other Variable Costs)

**Gross Profit (C) A − B = C**

**Gross Profit(C)**

**− Fixed Operating Cost (D) C − D = E**

**Profit Before Taxes (E)**

**Profit Before Taxes (E) E − F = G**

**− Taxes (F)**

**Net Profit or Loss (G)**

**Example:** Prepare an income statement for sales of leather jackets in March, if:

* A = $25,000.00
* B1 = $6,715.00; B2 = $100.00
* D = $83.00
* F = 25%

|  |  |  |  |
| --- | --- | --- | --- |
| **(A)** | **Sales** |  | $25,000.00 |
| **− (B)** | **Total Variable Costs**  **( B1 + B2)** | **(B1) COGS:** $6715.14  **+ (B2) Other Variable Costs: +** 100.00  **= Total Variable Costs:** $6815.14 } | 6815.14 |
| **= (C)** | **Gross Profit** |  | 18,184.86 |
| **− (D)** | **Fixed Operating Costs** | 83.00 |
| **= (E)** | **Profit Before Taxes** | 18,101.86 |
| **− (F)** | **Taxes @ 25%** | 4525.47 |
| **= (G)** | **Net Profit** | $13,576.39 |

**1.** Write an Income Statement for **The Beaded Necklace Company.**

**A) Total Sales** = the Consumer Price ($25.00) x the Number of Necklaces Sold (10)

**B) Total Variable Cost** is COGS ($15.81) x the Number of Necklaces Sold (10)

**C) Gross Profit or (Loss)** is A - B = C

**D) Total Fixed Operating Costs** areD ($10.00)

**E) Profit or Loss Before Taxes** is C - D = E

**F) Taxes** are 25% of E

**G) Net Profit or Loss** is E - F = G

**0000000000000000000**

**The Beaded A - B = C**

**Necklace Co. C - D = E**

000000000000 **E - F = G**

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | Total Sales | **A =** | $250.00 |
| **B** | Total Variable Cost (COGS) | **B =** | 158.10 |
| **C** | Gross Profit or Loss | **C =** | 91.90 |
| **D** | Fixed Operating Costs | **D =** | 10.00 |
| **E** | Profit or Loss Before Taxes | **E =** | 81.90 |
| **F** | Taxes | **F =** | 20.48 |
| **G** | Net Profit or (Loss) | **G =** | $61.42 |

**2.** Write an Income Statement for **Mythical Windsocks.**

During his first year in college, Travis noticed that some college students liked to buy items that had the name of their home state on them. Travis designed and produced windsocks for several states, and the college bookstore agreed to sell them on consignment. Write a quarterly Income Statement for Travis’ company, Mythical Windsocks, using the following numbers:

(A = $500.00) (B = $252.00) (D = $30.00) (F = 25%)

**Mythical A - B = C**

**Windsocks C - D = E**

**E - F = G**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A** | **Total Sales** |  | **A =** | $500.00 |
| **B** | **Variable Costs incl. COGS** |  | **B =** | 252.00 |
| **C** | **Gross Profit or Loss** |  | **C =** | 248.00 |
| **D** | **Fixed Operating Costs** |  | **D =** | 30.00 |
| **E** | **Profit or Loss Before Taxes** |  | **E =** | 218.00 |
| **F** | **Taxes** |  | **F =** | 54.50 |
| **G** | **Net Profit or Loss** |  | **G =** | 163.50 |
|  |  |  |  |  |
|  |  |  |  |  |

**3.** Write an Income Statement for **Shoulder It All.**

For years, Magdalena made her own handbags. At first, she only made them for friends and family members. Before too long, she had to hire her cousin to help sew and deliver the bags to the dozen boutiques that bought them. Write Magdalena’s income statement using the following numbers:

(A = $31,447.50) (B = $13,387.50) (D = $1,600) (F = 25%)

**Shoulder A - B = C**

**It ALL C - D = E**

**E - F = G**

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **Total Sales** | **A =** | $31,447.50 |
| **B** | **Total Variable Costs incl. Total COGS** | **B =** | 13,387.50 |
| **C** | **Gross Profit or Loss** | **C =** | 18,060.00 |
| **D** | **Fixed Operating Costs** | **D =** | 1,600.00 |
|  |  |  |  |
| **E** | **Profit or Loss Before Taxes** | **E =** | 16,460.00 |
| **F** | **Taxes** | **F =** | 4,115.00 |
| **G** | **Net Profit or Loss** | **G =** | $12,345.00 |

**4.** Write an Income Statement for **Karen and Diana.**

The Holiday Basket is one of the biggest sellers for the mail order catalogue started by Karen and Diana, two young single mothers who wanted to work at their own schedules out of their own homes. The Holiday Basket was introduced in their fifth year of business. Prepare their Income Statement for October through December using the following numbers:

(A = $609,300.00) (B = $167,557.50) (D1 = $9,000.00) (D2 = $750.00) (F = 25%)

**Karen A - B = C**

**& C - D = E**

**Diana E - F = G**

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **Total Sales** | **A =** | $609,300.00 |
|  |  |  |  |
| **B** | **Total Variable Costs incl. COGS** | **B =** | 167,557.50 |
| **C** | **Gross Profit or Loss** | **C =** | 441,742.50 |
| **D** | **Fixed Operating Costs** | **D =** | 9,750.00 |
|  |  |  |  |
| **E** | **Profit or Loss Before Taxes** | **E =** | 431,992.50 |
|  |  |  |  |
| **F** | **Taxes** | **F =** | 107,998.13 |
|  |  |  |  |
| **G** | **Net Profit or Loss** | **G =** | $323,994.37 |

**5.** Write an Income Statement for **Bibs for Babes**

Nina did a lot of babysitting and got the idea for sewing baby bibs to earn extra money. Prepare her Income Statement with the following information:

24 Baby Bibs sold at a Consumer Price of $6.95 each. The Cost of Goods Sold was $2.75 per bib. There was a Fixed Cost of $10.00 for making copies of an advertising flyer, and Nina paid 25% tax.

**Bibs...**

**for** **Babes** **A - B = C**

**C - D = E**

**E - F = G**

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **Total Sales** | **A =** | $166.80 |
|  |  |  |  |
| **B** | **Total Variable Costs incl. COGS** | **B =** | 66.00 |
| **C** | **Gross Profit or Loss** | **C =** | 100.80 |
| **D** | **Fixed Operating Costs** | **D =** | 10.00 |
|  |  |  |  |
| **E** | **Profit or Loss Before Taxes** | **E =** | 90.80 |
|  |  |  |  |
| **F** | **Taxes** | **F =** | 22.70 |
|  |  |  |  |
| **G** | **Net Profit or Loss** | **G =** | $68.10 |

**6.** Write an Income Statement for **Sibling’s Tees.**

Write an Income Statement based on the following: A sister and brother spent their spring vacation tie-dying 200 T-shirts to sell over the summer. They sold all 200 shirts in July. The Selling Price was $12.95 per shirt. Their Total Cost of Goods Sold was $6.35 each. They spent $100 on advertising (a Fixed Operating Cost). They paid 25% in taxes.

(A = $2,590.00) (B = $1,270.00) (D = $100.00) (F = 25%)

**TTTTTTTTTTTTTTTTT**

**Sibling’s Tees** **A - B = C**

**C - D = E**

**TTTTTTTTTTTTTT**

**E - F = G**

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **Total Sales** | **A =** | $2,590.00 |
|  |  |  |  |
| **B** | **Total Variable Costs incl. COGS** | **B =** | 1,270.00 |
| **C** | **Gross Profit or Loss** | **C =** | 1,320.00 |
|  |  |  |  |
| **D** | **Fixed Operating Costs** | **D =** | 100.00 |
|  |  |  |  |
| **E** | **Profit or Loss Before Taxes** | **E =** | 1,220.00 |
|  |  |  |  |
| **F** | **Taxes** | **F =** | 305.00 |
|  |  |  |  |
| **G** | **Net Profit or Loss** | **G =** | $915.00 |

**7.** Write an Income Statement for **Morgan’s Hair Stuff.**

Write an Income Statement for this young entrepreneur. Morgan sold a total of 350 Daisy Hair Scrunchies at five street fairs. The Total Variable Costs including Cost of Goods Sold was $0.96 each. The Selling Price was $5.00 each. Morgan had no Fixed Operating Costs, but paid 25% in taxes.

///// \\\\\\\\\

**Morgan’s** **A − B = C**

**Hair**  **C – D = E**

**Stuff E − F = G**

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **Total Sales** | **A =** | $1,750.00 |
| **B** | **Total Variable Costs** | **B =** | 336.00 |
| **C** | **Gross Profit or Loss** | **C =** | 1,414.00 |
| **D** | **Fixed Operating Costs** | **D =** | 0.00 |
| **E** | **Profit or Loss Before Taxes** | **E =** | 1,414.00 |
| **F** | **Taxes** | **F =** | 353.50 |
| **G** | **Net Profit or Loss** | **G =** | $1,060.50 |

**8.** Write an Income Statement for **Malcolm’s Time.**

Malcolm wants to find out if his business is profitable and if he should continue building and selling quartz clocks. He decides to put together an Income Statement. Compile one with the following information:

His Total Cost of Goods Sold was $16.01 per clock. During the relevant time period, he sold 150 clocks at a price of $39.00 each. He spent $495.00 on power tools (a Fixed Operating Cost), and he paid 25% tax.

Malcolm’s **A - B = C**

TIME **C - D = E**

**E - F = G**

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **Total Sales** | **A =** | $5,850.00 |
| **B** | **Total Cost of Goods Sold** | **B =** | 2,401.50 |
| **C** | **Gross Profit or Loss** | **C =** | 3,448.50 |
| **D** | **Fixed Operating Costs** | **D =** | 495.00 |
| **E)** | **Profit or Loss Before Taxes** | **E =** | 2,953.50 |
| **F)** | **Taxes** | **F =** | 738.38 |
| **G)** | **Net Profit or Loss** | **G =** | $2,215.12 |

Is Malcolm’s business profitable enough that he should continue building and selling quartz clocks?

**9.** Write an Income Statement for **Jump Street.**

A father and his daughter made a jump rope as a birthday present. Everyone in the family liked it so much, the daughter decided to make more ropes to sell. In the first month of business, she sold 75 customized ropes for $10.00 each. The Total Variable Costs including COGS was $2.40 per rope. Her Fixed Operating Costs were $5.95 and she paid 25% tax. Prepare an Income Statement for her.

**A - B = C**

JUMP **Street** **C - D = E**

**E - F = G**

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **Total Sales** | **A =** | $750.00 |
| **B** | **Total Variable Costs incl. COGS** | **B =** | 180.00 |
| **C** | **Gross Profit or Loss** | **C =** | 570.00 |
| **D** | **Fixed Operating Costs** | **D =** | 5.95 |
| **E** | **Profit or Loss Before Taxes** | **E =** | 564.05 |
| **F** | **Taxes** | **F =** | 141.01 |
| **G** | **Net Profit or Loss** | **G =** | 423.04 |

**10.** Write an Income Statement for **Candle Bright.**

Keela learned to make candles when she was in the Girls Scouts. She decided to use this skill to earn some extra money. She made 100 apple-shaped candles to sell over the holidays. The Cost of Goods Sold per candle was $3.60. She sold 75 candles at $8.00 each. She had no Fixed Operating Costs, and she paid 25% tax. Write up an Income Statement using these figures.

**()**

#######

**CANDLE A - B = C**

**Bright** **C - D = E**

**E - F = G**

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **Total Sales** | **A =** | $600.00 |
| **B** | **Total Cost of Goods Sold** | **B =** | 270.00 |
| **C** | **Gross Profit or Loss** | **C =** | 330.00 |
| **D** | **Fixed Operating Costs** | **D =** | 0.00 |
| **E** | **Profit or Loss Before Taxes** | **E =** | 330.00 |
| **F** | **Taxes** | **F =** | 82.50 |
| **G** | **Net Profit or Loss** | **G =** | $247.50 |

**Getting More Difficult**

11. Leon started his plant business, Plentiful, with cuttings and transplants from his grandmother’s garden. Now in its fifth year, Plentiful needs an Income Statement for a Seed Starter Tray. Leon sold 5,510 of these gift trays at a consumer price of $12.00 each. His Total Cost of Goods Sold (B1) was $3.08 each; his Other Variable Costs (B2) were $850.00. His Fixed Operating Costs were $2,750.00. He paid 25% tax. Use the Income Statement calculation to figure out Leon’s profit or loss from this business.

**A –(B1 + B2)= C Remember: B1 = COGS; B2 = Other Variable Costs**

**C − D = E**

**E − F = G**

|  |  |  |  |
| --- | --- | --- | --- |
| **A** | **Total Sales** | **A =** | $66,120.00 |
| **B** | **Total Variable Costs**  **(B1 + B2)**  **B1 Cost of Goods Sold \_\_\_\_\_\_**  **B2 Other Variable Costs \_\_\_\_\_\_** | **B =** | 16,970.80 |

|  |  |  |  |
| --- | --- | --- | --- |
| **C** | **Gross Profit or Loss** | **C =** | 49,149.20 |
| **D** | **Fixed Operating Costs** | **D =** | 3,600.00 |
| **E** | **Profit or Loss Before Taxes** | **E =** | 45,549.20 |
| **F** | **Taxes** | **F =** | 11,387.30 |
| **G** | **Net Profit or Loss** | **G =** | $34,161.90 |

So, Leon’s profit was **$34,161.90**

**12.** Sea Shell Picture Frames sold very well at the beach gift shop during the summer season. The store sold 1,008 at $20.00 each. The Total Cost of Goods Sold was $9.00 each. Fixed Operating Costs were $1,000.00, and Other Variable Costs were $350.00. The tax rate is 25%. Were the items profitable as well as popular? How profitable?

Yes, the items were profitable. The net profit for the picture frames for the summer was $4,698.

**13.** Rebecca built her first bird feeder when she was eleven, from a plan she had found on the back of a cereal box. Her company, Straighten Up and Fly Right, now has sales of nearly half a million dollars a year. She needs an Income Statement for her Martin Bungalow Wooden Bird Feeder. Over the period of this statement, her company sold 9,800 Bungalows for $19.00 each. The Total Cost of Goods Sold on each feeder was $8.35. Her Fixed Operating Costs were $10,000.00, and her Other Variable Costs were $800.00. She pays 25% tax. What profit did Rebecca make?

Rebecca made a profit of $47,820.

**14.** Andre made a video of the reunion concert of the Gross Prophets, his favorite band. The first weekend, he sold 98 copies at a Consumer Price of $50.00 each. His Total Cost of Goods Sold was $43.05 per tape. He had no Fixed Operating Costs, but disbursed $1,000 in Other Variable Costs. His tax rate was 25%. Where could Andre make some changes in his entrepreneurial venture to make it more profitable?

His profit was $2,892.71 but he could increase that considerably if he can reduce his Other Variable Costs. If that is not possible, he may want to consider raising the price of the video.

**15.** After a four-day weekend of selling Rice Krispies® Treats outside her home, Chelsea wanted to figure out how much profit her business made. 180 squares sold at $.50 each; Total Cost of Goods Sold was $.26 per square. She had no Fixed Costs, but she distributed flyers – an Other Variable Cost of $5.00. Chelsea paid 25% tax. What was her profit?

Chelsea had a profit of $28.65.

**16.** Ti hand-printed greeting cards and sold them through his mother’s gift store. For the period he considered, he sold 91 cards at $3.00 each. His Total Cost of Goods Sold was $1.25 per card. He had a Fixed Operating Cost of $4.95 and no Other Variable Costs. His tax rate is 25%. How much profit did Ti make?

Ti made a profit of $115.73.

**17.** Alex made a DVD-case cover as a Mother's Day present. Since his mother’s friends admired them, he decided to go into business. The first week, he sold 29 covers at $5.00 each. His Total COGS was $2.69 apiece. He had a Fixed Operating Cost of $7.95 and no Other Variable Costs. He paid 25% tax. How much profit did Alex earn?

Alex earned a profit of $17.48.

**18.** What was the profit or loss for The Box in the Window company based on the following numbers: 45 Window Boxes sold at a cost of $25.00 each; the Total Cost of Goods Sold was $4.79 each; Fixed Operating Costs were $525.00; and Other Variable Costs were $381.50. The business pays taxes of 25%.

The Box in the Window company made a small profit of $2.21.

**19.** Camilla went out crabbing every morning and supplied her friend’s local seafood restaurant, The Chesapeake, with soft-shell crabs all summer. Halfway through the season, Camilla and her friend decided to write an Income Statement so they could see the profitability of her operation clearly in numbers. Use the following figures to determine the loss or profit from the venture: 620 Soft-Shell Crab Sandwiches sold at $12.50 each; Total Cost of Goods Sold is $2.77 per sandwich; there is an Other Variable Cost of $75.00 and a Fixed Operating Cost of $375.00. The Restaurant pays taxes at a rate of 25%.

Camilla’s sandwiches are a very profitable operation, bringing in a profit of $4,186.95.

**20.** During an unusually hot July, an ice cream stand compiled the following numbers on one of their biggest sellers — the Black and White Milkshake − during the month of July: 1,301 milkshakes sold at $3.69 each. The Total Cost of Goods Sold was $1.75 per shake. Fixed Operating Costs: $430.00; Other Variable Costs: $32.00. The tax rate is 25%. How profitable for the store was this popular product?

The Black and White Milkshakes made a profit of $1,546.46 for the store during the month of July.

**Extras for Experts**

**21.** The ice cream store business in question 20, actually had Total Fixed Operating Costs for July of $4300.00. Why might the ice cream store have decided to charge only $430.00 of that amount to the Income Statement for Black and White Milkshakes?

Fixed Operating Costs for a business are based on total sales of all the products sold. Black and White Milkshakes were “one of their biggest sellers”, but the store sold other products, too. The owner could have decided to charge only 10% ($430 of $4300) of the total Fixed Operating Costs because sales of Black and White Milkshakes were only roughly 10% of total sales.

**22.** In question 19, The Chesapeake reported Other Variable Costs of $75.00. What might those expenses have been?

Other Variable Costs includes expenses that are directly related to selling a product, but are not a direct Cost of Goods Sold. Answers will vary, but assuming that Camilla included her own labor costs as part of the COGS, Other Variable Costs could have included hourly pay or commission for a part-time worker who helped with the crabbing, or the cost of bait used to catch the crabs, or the cost of ice to keep the crabs alive until they were served.

# Business Math Skills for Entrepreneurs

**2.4 Return on Investment (ROI)**

Return on Investment is the net profit on an investment expressed as a percentage of the initial investment.

**Net Profit**

**ROI = Investment X 100**

**Think: times 100 because ROI is expressed as a %.**

**Remember: Net Profit = (A – B)**

**A =** Value of investment at the end of the period

**B =** Value of initial investment (what you started with)

**Example:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Type**  **of Investment** | **A**  **(value of**  **investment**  **at the end of the period)** | **B**  **(value of**  **initial**  **investment)** | **Net Profit**  **(A − B)** | **÷ B** | **X 100** | **Return on Investment** |
| Make and sell leather jackets | $15,000.00 | $10,000.00 | $15,000 −$10,000  **$ 5,000** | 5,000  ÷ 10,000  = **.5** | .5  X 100 | **= 50%** |
| Make and sell beaded necklaces | $400 | $200 | $400  −$200  $200 | 200  ÷  200  = 1 | 1  X 100 | **= 100%** |

**1.** Determine the Return on Investment for the following businesses:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Type**  **of**  **Investment** | **A**  **(value of**  **investment**  **at the end**  **of the period)** | **B**  **(value of**  **initial**  **investment)** | **Net Profit**  **(A − B)** | **÷ B**  **(÷ value of**  **initial**  **investment)** | **X 100**  **(to convert to a percentage)** | **%**  **Return**  **on Investment**  **(ROI)** |
| **Windsock**  **business** | $1,000 | $500 | $500 | 1 | 1 x 100 | 100% |
| **Sling Bag**  **business** | $100,000 | $25,000 | $75,000 | 3 | 3 x 100 | 300% |
| **Holiday**  **Basket**  **business** | $750,000 | $500,000 | $250,000 | .5 | .5 x 100 | 50% |
| **Baby Bib**  **business** | $300 | $100 | $200 | 2 | 2 x 100 | 200% |
| **Tie-Dyed**  **T-Shirt business** | $5,000 | $1,500 | $3,500 | 2.33 | 2.33 x 100 | 233% |
| **Hair Scrunchy**  **business** | 1,500 | $500 | $1,000 | 2 | 2 x 100 | 200% |
| **Quartz**  **Clock business** | $6,000 | $3,000 | $3,000 | 1 | 1 x 100 | 100% |
| **Jump Rope**  **business** | $750 | $200 | $550 | 2.75 | 2.75 x 100 | 275% |
| **Apple Candle**  **business** | $100 | $100 | $0 | 0 | 0 x 100 | 0% |
| **Seed Tray**  **business** | $50,000 | $40,000 | $10,000 | .25 | .25 x 100 | 25% |
| **Sea Shell Frame**  **business** | $8,000 | $200 | $7,800 | 39 | 39 x 100 | 3900% |

**Extras for Experts**

**2.** Complete the table. Add any missing information.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Type**  **of**  **Investment** | **A**    **(value of**  **investment**  **at the end**  **of the period)** | **B**  **(value of**  **initial**  **investment)** | **Net Profit**    **(A − B)** | **%**  **Return**  **on Investment**  **(ROI)** |
| Bird  Feeder sales | $250,000 | $100,000 | $150,000 | 150% |
| Demo Tape Duping business | (-$500) | $2,000 | -$2,500 | (-125%) |
| Rice  Krispies®  Treat sales | $60 | $20 | $40 | 200% |
| Greeting  Card sales | $150 | $50 | $100 | 200% |
| DVD Case  Cover business | $175 | $25 | $150 | 600% |
| Window  Box sales | $500 | $250 | $250 | 100% |
| Crab  Sandwich  sales | $10,000 | $1,000 | $9,000 | 900% |
| Milk-  Shake sales | $2,500 | $250 | $2,250 | 900% |
| Swim Team Fund-raiser  Concert | $3,700 | $3,700 | $0 | 0% |

**3.** If Jerome invested $450 to start and operate his business for one year and his total sales for that period were $450, did he really break even? Why?

He probably lost money because he devoted his time, talents, and energy and got no return on their value. He could have used his $450 in a better investment - even into a risk-free savings account - and made more on his investment without doing any work.