THINK-NTH FREE MATH RESOURCE

Fractions, Decimals & Percents

Progressive Skills Practice

MIDDLE SCHOOL / PRE-ALGEBRA

Start with the foundation. Move forward only when the earlier level feels comfortable.

Quick Reference

Fraction → Decimal Divide: numerator ÷ denominator. 3/4 = 3 ÷ 4 = 0.75

Decimal → Percent Multiply by 100 (move the decimal two places right). 0.75 = 75%

Percent → Decimal Divide by 100 (move the decimal two places left). 35% = 0.35

Percent → Fraction Write the percent over 100 and simplify. 25% = 25/100 = 1/4

The same value, three ways: 3/4 ↔ 0.75 ↔ 75%

FOUNDATION

Level 1: Build the Connection

Directions: Convert each value into the two missing forms. Simplify all fractions.

1. 1/2 = _____ decimal = _____ %

2. 1/4 = _____ decimal = _____ %

3. 3/4 = _____ decimal = _____ %

4. 1/5 = _____ decimal = _____ %

5. 2/5 = _____ decimal = _____ %

6. 1/10 = _____ decimal = _____ %

7. 0.5 = _____ fraction = _____ %

8. 0.25 = _____ fraction = _____ %

9. 0.8 = _____ fraction = _____ %

10. 20% = _____ decimal = _____ fraction

11. 50% = _____ decimal = _____ fraction

12. 75% = _____ decimal = _____ fraction

DEVELOPING

Level 2: Convert & Compare

A. Convert. Fill in the two missing forms. Simplify all fractions.

1. 3/5 = _____ decimal = _____ %

2. 7/10 = _____ decimal = _____ %

3. 9/20 = _____ decimal = _____ %

4. 11/20 = _____ decimal = _____ %

5. 0.45 = _____ fraction = _____ %

6. 0.125 = _____ fraction = _____ %

7. 0.875 = _____ fraction = _____ %

8. 35% = _____ decimal = _____ fraction

9. 62% = _____ decimal = _____ fraction

10. 125% = _____ decimal = _____ fraction

B. Compare. Write <, >, or = in each blank.

11. 0.6 _____ 55%

12. 3/4 _____ 0.72

13. 42% _____ 2/5

14. 0.35 _____ 7/20

C. Order each set from least to greatest.

15. 1/2, 48%, 0.55 → _____

16. 0.7, 2/3, 68% → _____

17. 3/8, 0.4, 36% → _____

Think About It

How can converting everything into the same form make comparison easier?

ON-LEVEL

Level 3: Percent of a Number

Strategy

Method 1 — Convert and multiply. 30% of 80 → 0.30 × 80 = 24

Method 2 — Proportional reasoning. 10% of 80 = 8, so 30% of 80 = 3 × 8 = 24

Directions: Find each percent of a number. Problems 1–6 are mental-math friendly; 7–12 may need a calculator.

1. 10% of 90 = _____

2. 50% of 46 = _____

3. 25% of 60 = _____

4. 20% of 145 = _____

5. 30% of 80 = _____

6. 5% of 140 = _____

7. 40% of 125 = _____

8. 15% of 80 = _____

9. 60% of 45 = _____

10. 32% of 250 = _____

11. 7.5% of 160 = _____

12. 145% of 60 = _____

Applications. Show your reasoning for each.

13. A jacket originally costs $64 and is discounted by 25%. How much is the discount? What is the sale price?

14. Maya answered 34 of 40 questions correctly on a test. What percent did she score?

15. A restaurant bill is $52.00. If the tip is 18%, how much is the tip and what is the total?

16. In a survey of 250 students, 36% said mathematics is their favorite subject. How many students is that?

ADVANCED

Level 4: Advanced Percent Problems

Strategy Reminder

Part ÷ Whole = Percent (as a decimal)

Percent Change = Change ÷ Original (always divide by the **original** amount)

A. Find the percent.

1. 18 is what percent of 60?

2. 21 is what percent of 84?

3. 27 is what percent of 60?

B. Find the whole.

4. 24 is 30% of what number?

5. 45 is 60% of what number?

6. 13 is 26% of what number?

C. Percent increase.

7. A value increases from 40 to 52. Find the percent increase.

8. A club grows from 25 members to 32 members. Find the percent increase.

9. A savings balance rises from $80 to $96. Find the percent increase.

D. Percent decrease.

10. A price decreases from $120 to $90. Find the percent decrease.

11. A weekly total drops from 90 minutes to 72 minutes. Find the percent decrease.

12. Attendance falls from 250 to 225. Find the percent decrease.

CHALLENGE

Level 5: Challenge Problems

Directions: Each problem takes more than one step. Decide which percent skill applies, then show all reasoning.

1. Sales tax + discount. A jacket costs $80. It is marked 30% off, and then 8% sales tax is added to the sale price. What is the final amount paid?

2. Multiple discounts. A $200 coat is discounted 20%, and the new price is discounted another 20%. What is the final price? Do two successive 20% discounts equal one 40% discount? Explain.

3. Reverse percent. After a 25% discount, a pair of shoes costs $63. What was the original price?

4. Quantity change. A town of 1,200 people grows by 15% in one year, then decreases by 10% the next year. What is the population after two years? What is the overall percent change from 1,200?

5. Error analysis. A student finds 30% off a $50 item by writing: $50 - 0.30 = 49.70$. What mistake did the student make? Correct the reasoning and find the true sale price.

6. Reasoning. A price increases by 20% and then decreases by 20%. Is the final price the same as the original price? Explain using numbers.

7. Compare results. On Test 1 a student scored 45 out of 60. On Test 2 the student scored 21 out of 25. Which score is higher as a percent? What percent of all questions were answered correctly overall?

ANSWER KEY

Answer Key

Level 1 — Foundation

1. 0.5 = 50%
2. 0.25 = 25%
3. 0.75 = 75%
4. 0.2 = 20%
5. 0.4 = 40%
6. 0.1 = 10%
7. 1/2 = 50%
8. 1/4 = 25%
9. 4/5 = 80%
10. 0.2 = 1/5
11. 0.5 = 1/2
12. 0.75 = 3/4

Level 2 — Developing

1. 0.6 = 60%
2. 0.7 = 70%
3. 0.45 = 45%
4. 0.55 = 55%
5. 9/20 = 45%
6. 1/8 = 12.5%
7. 7/8 = 87.5%
8. 0.35 = 7/20
9. 0.62 = 31/50
10. 1.25 = 5/4
11. > (0.6 = 60% > 55%)
12. > (0.75 > 0.72)
13. > (42% > 40%)
14. = (7/20 = 0.35)
15. 48%, 1/2, 0.55
16. 2/3, 68%, 0.7 (0.667, 0.68, 0.70)
17. 36%, 3/8, 0.4 (0.36, 0.375, 0.40)

Level 3 — Percent of a Number

1. 9
2. 23
3. 15
4. 29
5. 24
6. 7
7. 50
8. 12
9. 27
10. 80
11. 12
12. 87

Level 3 — Applications

13. 0.25 × 64 = $16 discount; 64 − 16 = **$48** sale price
14. 34 ÷ 40 = 0.85 = **85%**
15. 0.18 × 52 = **$9.36** tip; total = 52 + 9.36 = **$61.36**
16. 0.36 × 250 = **90 students**

Answer Key (continued)

Level 4 — Advanced

1. 18 ÷ 60 = 0.3 = **30%**
2. 21 ÷ 84 = 0.25 = **25%**
3. 27 ÷ 60 = 0.45 = **45%**
4. 24 ÷ 0.30 = **80**
5. 45 ÷ 0.60 = **75**
6. 13 ÷ 0.26 = **50**
7. change = 12; 12 ÷ 40 = 0.30 = **30% increase**
8. change = 7; 7 ÷ 25 = 0.28 = **28% increase**
9. change = 16; 16 ÷ 80 = 0.20 = **20% increase**
10. change = 30; 30 ÷ 120 = 0.25 = **25% decrease**
11. change = 18; 18 ÷ 90 = 0.20 = **20% decrease**
12. change = 25; 25 ÷ 250 = 0.10 = **10% decrease**

Level 5 — Challenge

1. Discount: 0.30 × 80 = 24, so sale price = $56. Tax: 0.08 × 56 = $4.48. Final amount = 56 + 4.48 = **$60.48**.

2. 200 × 0.80 = 160; 160 × 0.80 = **$128**. A single 40% discount would give 200 × 0.60 = $120. They are **not** equal, because the second 20% is taken from the reduced price ($160), not the original. Two 20% discounts equal one 36% discount.

3. The sale price is 75% of the original: 0.75x = 63, so x = 63 ÷ 0.75 = **$84**.

4. Year 1: 1200 × 1.15 = 1380. Year 2: 1380 × 0.90 = **1242 people**. Overall change = 42 ÷ 1200 = 0.035 = **3.5% increase**.

5. The student subtracted the decimal 0.30 instead of 30% *of* $50. Correct: 0.30 × 50 = $15 discount, so the sale price is 50 − 15 = **$35** (or 0.70 × 50 = $35).

6. No. Using $100: 100 × 1.20 = 120, then 120 × 0.80 = 96. The final price is **4% less** than the original, because the 20% decrease is taken from the larger amount.

7. Test 1: 45 ÷ 60 = 75%. Test 2: 21 ÷ 25 = 84%. **Test 2 is higher.** Overall: (45 + 21) ÷ (60 + 25) = 66 ÷ 85 ≈ 0.776 = **77.6%**.