

# Grade 7 Mathematics Worksheet

## Organizing and Presenting Data (Advanced Visual Analysis)

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_

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### Learning Objectives

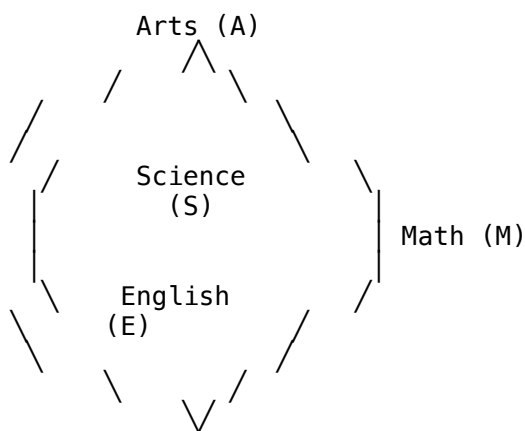
By the end of this worksheet, you will be able to: - Create and analyze pie charts, waffle diagrams, scatter diagrams, and histograms - Identify misleading data representations and logical fallacies - Solve complex multi-step problems involving data visualization - Apply critical reasoning to evaluate appropriate chart selection

### Instructions

- Show all your working clearly
  - Pay careful attention to visual diagrams and scales
  - For logic questions, explain your reasoning step by step
  - Use precise mathematical language and notation
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## Section A: Visual Interpretation Challenges (25 marks)

1. **Pie Chart Puzzle:** Study this pie chart representation:



Given: Total students = 360, Math angle =  $100^\circ$ , Science angle =  $120^\circ$

- If Arts and English have equal numbers of students, calculate the exact number of students in each subject. (4 marks)
- A student claims “More than  $\frac{1}{4}$  of students prefer Math.” Is this claim mathematically correct? Prove your answer. (3 marks)

**Answer:** \_\_\_\_\_

2. **Waffle Diagram Logic Trap:**

Survey Results (100 squares total):



A tech company states: “Laptops are preferred by exactly twice as many people as tablets.”

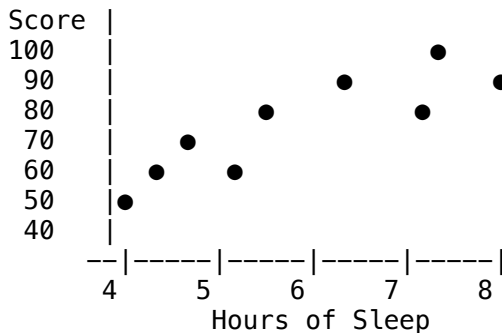
- Verify this claim mathematically. Show your calculation. (2 marks)
- The company then claims: “Smartphones and tablets combined represent exactly half of all preferences.” Identify the logical error in this reasoning. (3 marks)

Answer: \_\_\_\_\_

## Section B: Construction and Analysis (30 marks)

### 3. Scatter Diagram Detective Work:

Hours of Sleep vs Test Score:

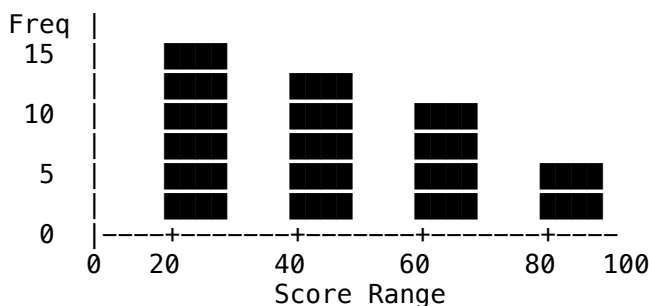


- One student slept 6 hours and scored 60%. Another slept 5 hours and scored 70%. Explain why this contradicts the apparent trend and suggest two possible explanations. (4 marks)
- If a student sleeps 7.5 hours, predict their test score range and justify your prediction method. (3 marks)

Answer: \_\_\_\_\_

### 4. Histogram Frequency Trick:

Class Test Scores Distribution:



The histogram shows equal bar widths, but the intervals are: 0-20, 20-35, 35-55, 55-80.

- Explain why this histogram is misleading and calculate the correct frequency density for each interval. (5 marks)

- b. Redesign the histogram with correct proportional bar widths. Show your calculations. (3 marks)

**Answer:** \_\_\_\_\_

## Section C: Multi-Step Problem Solving (35 marks)

5. **Data Representation Strategy Game:** A marketing team has collected data on customer ages: Ages: 16, 18, 19, 22, 25, 25, 26, 28, 30, 32, 35, 38, 40, 42, 45, 48, 50, 55, 60, 65

- Create frequency tables suitable for: (i) Histogram with 5 equal intervals, (ii) Pie chart with 4 age groups. Show all calculations. (6 marks)
- The team wants to convince investors that they appeal to “young adults.” Which representation would best support this claim and why? (3 marks)
- If they wanted to show “broad age appeal,” which representation would be most effective? Justify your choice. (3 marks)

**Answer:** \_\_\_\_\_

6. **The Misleading Chart Challenge:** You’re given this data about smartphone usage:

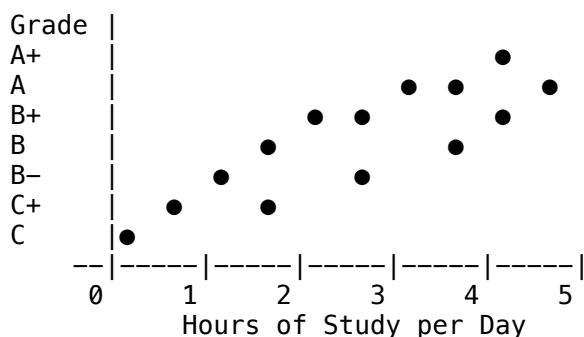
### Age Group Daily Hours Sample Size

13-17	8.2	50
18-25	6.8	200
26-35	4.5	300
36-50	3.2	100

- Calculate the weighted average daily usage across all age groups. (4 marks)
- A newspaper creates a pie chart showing “8.2, 6.8, 4.5, 3.2” as the four sectors. Explain three major errors in this representation. (6 marks)
- Recommend the most appropriate chart type for this data and justify your choice. (3 marks)

**Answer:** \_\_\_\_\_

7. **Advanced Correlation Analysis:** Study habits vs Grade correlation data:



- Calculate the approximate correlation strength (weak, moderate, strong) and explain your reasoning. (3 marks)
- A student concludes: “Studying more guarantees better grades.” Identify the logical fallacy and provide a counterargument. (4 marks)

Answer: \_\_\_\_\_

## Section D: Critical Thinking Extensions (30 marks)

8. **The Perfect Data Presentation:** A school principal wants to present attendance data to three different audiences:

- School board (formal, statistical)
- Parents (accessible, reassuring)
- Students (engaging, motivational)


Attendance data: Monday 92%, Tuesday 88%, Wednesday 85%, Thursday 90%, Friday 78%

- a. Design three different visual representations for these three audiences. Explain your reasoning for each choice. (9 marks)
- b. Predict how each audience might misinterpret the same data differently. (3 marks)

Answer: \_\_\_\_\_

9. **Data Transformation Logic:** Convert this waffle diagram data into other formats:

Favorite Seasons (100 squares):

Spring:  (28 squares)

Summer:  (40 squares)

Autumn:  (16 squares)

Winter:  (16 squares)

- a. Calculate the exact angles needed for a pie chart representation. (4 marks)
- b. If you surveyed 250 people instead of 100, calculate the new frequencies while maintaining the same proportions. (3 marks)
- c. Create a histogram if you grouped the data into “Warm seasons” (Spring/Summer) vs “Cool seasons” (Autumn/Winter). Show frequency and percentage. (3 marks)

Answer: \_\_\_\_\_

10. **Statistical Reasoning Challenge:** A fitness app claims their users “doubled their daily steps” and shows this data:

Before: Average 3,000 steps (Sample: 50 users) After: Average 6,000 steps (Sample: 500 users)

- a. Identify three statistical problems with this comparison. (6 marks)
- b. Design a more reliable study to test their claim. Include sample size, data collection method, and appropriate chart type. (6 marks)

Answer: \_\_\_\_\_

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Total: \_\_\_\_\_ / 120 marks

## Self-Assessment

- I can interpret complex visual data representations: ☐ Confident ☐ Mostly ☐ Need practice

- I can identify misleading data presentations: ☐ Confident ☐ Mostly ☐ Need practice
- I can choose optimal chart types for different purposes: ☐ Confident ☐ Mostly ☐ Need practice
- I can apply logical reasoning to data problems: ☐ Confident ☐ Mostly ☐ Need practice

## Key Methods to Remember

- **Pie Chart:** Angles =  $(\text{frequency} \div \text{total}) \times 360^\circ$ , best for parts of whole
- **Waffle Diagram:** Uses 100 squares, each square = 1%, excellent for percentages
- **Scatter Diagram:** Shows correlation between two variables, watch for outliers
- **Histogram:** Frequency density =  $\text{frequency} \div \text{class width}$ , bars must touch for continuous data
- **Critical Analysis:** Always consider sample size, bias, and context when interpreting data

## Visual Analysis Tips

- Look for scale distortions and misleading proportions
- Check if sample sizes support the conclusions drawn
- Consider alternative explanations for apparent patterns
- Question whether the chart type matches the data type and purpose