

Red Zone Ratios

Inside the opponent's **20-yard line** is the red zone — where scoring chances spike. Use rates, proportions and percents to read the drive chart. Every player and team on this sheet is made up. TD = 6, PAT kick = 1, FG = 3, two-point try = 2.

Name _____

Date _____

MATH TOOLKIT

Unit rate

Divide to find "per 1"
(yards per play)

Proportion

Equal ratios: $a/b = c/d$

Percent

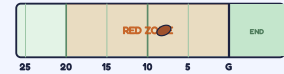
Part ÷ whole × 100

Expected pts

Sum of (probability × points)

Red zone

Inside the opponent's 20-yard line



Inside the 20
SCORE OR SETTLE

ROOKIE

- 1 The Harbor Otters face **1st-and-goal** from the opponent's **12-yard line**. They need **4 plays** to score. What is their average yards to the goal line **per play**?

WORK SPACE

_____ yards/play

ROOKIE

- 2 In October, the Cedar Foxes reached the red zone on **10 trips** and scored a touchdown on **7** of them. What was their red-zone touchdown percentage?

WORK SPACE

_____ %

STARTER

- 3 The rule of three: if the Otters score a TD on **3 of every 5** red-zone trips, how many TDs would you expect in **20** trips at that same rate?

WORK SPACE

_____ TDs

STARTER

- 4 In the red zone, QB Ava completed **15 of 20** passes. QB Ben completed **18 of 25**. Who had the higher completion percentage, and by how many percentage points?

WORK SPACE

PRO

- 5 A touchdown is worth **6** points. A made PAT kick adds **1**. A field goal is worth **3**. How many **more** points is a TD + PAT than a field goal?

WORK SPACE

_____ pts

PRO

- 6 On a red-zone drive, the chance of a TD + PAT (7 pts) is **0.4**, the chance of a FG (3 pts) is **0.3**, and otherwise the team scores **0**. What is the expected points for that drive?

WORK SPACE

_____ pts

ALL-STAR

- 7 Last month the Foxes scored **12** red-zone touchdowns and **8** red-zone field goals. Write the ratio of TDs to FGs in **simplest form**.

WORK SPACE

_____ :

CHALLENGE ★

- 8 Challenge: In one game the Otters had **8** red-zone trips: **5** ended in a TD + PAT, **2** in a FG, and **1** in a turnover (0 pts). How many total points did they score from the red zone, and what was their points-per-trip rate?

WORK SPACE

A Red-Zone Drive Chart

The Harbor Otters' last six red-zone trips. The start column is the yard line (yards from the opponent's goal). Fill the last column for scoring drives: start ÷ plays.

DRIVE	START	PLAYS	OUTCOME	PTS	YDS/PLAY
Drive 1	18	3	TD + PAT	7	
Drive 2	12	4	FG	3	
Drive 3	8	2	TD + PAT	7	
Drive 4	15	5	Turnover	0	
Drive 5	6	1	TD + 2-pt	8	
Drive 6	16	4	FG	3	

Made-up team. Red zone = inside the 20. Skip the yards/play box on the turnover.

- How many **total points** did the Otters score from these six red-zone drives? _____ pts
- What was their red-zone **touchdown percentage**? (TDs ÷ trips × 100) _____ %
- For each scoring drive, fill in yards to goal ÷ plays. Which drive had the **lowest** yards-per-play? _____
- What was the **average** yards-per-play across the five scoring drives? _____ yds/play

B Foxes vs Hawks

Two made-up teams' red-zone stats through mid-October. Empty trips scored neither a TD nor a FG.

STAT	FOXES	HAWKS
Red-zone trips	15	12
Touchdowns	9	8
Field goals	4	2
Empty (0 pts)	2	2

TD % = TDs ÷ trips × 100

- Compute each team's red-zone **TD percentage**. Who is more efficient at scoring TDs, and by about how many percentage points? _____
- Assume every TD is followed by a made PAT (7 pts) and every FG is 3 pts. What is each team's **expected points per red-zone trip**? _____
- Write the ratio of Fox touchdowns to Hawk touchdowns in **simplest form**. _____ : _____

C Stay At or Above 60%

Set up an inequality, then check the smallest whole number that works.

- Coach keeps the starting QB only if the team's overall red-zone TD rate reaches at least **60%**. So far: **4 TDs in 8 trips**. Over the **next 10** trips, what is the **fewest** TDs they need so that $(4 + \text{new TDs}) \div 18 \geq 0.60$? _____ TDs

BONUS

A red-zone drive ends with a TD + successful 2-point try (**8 pts**) with probability **0.35**, a FG (**3 pts**) with probability **0.25**, and otherwise **0**. What is the expected points?

pts

WORK SPACE

Answer Key (for teachers & parents)

Answers for **Red Zone Ratios**. Accept equivalent forms (for example $41/8$ for 5.125 , or 66.7% for $66\frac{2}{3}\%$). Remind students that a red-zone trip starts when the offense crosses the opponent's 20-yard line.

Page 1 Problems

- Answer: 3 yards/play**
 $12 \div 4 = 3$.
- Answer: 70%**
 $7 \div 10 \times 100 = 70$.
- Answer: 12 TDs**
 $3/5 = x/20$, so $x = 12$.
- Answer: Ava, by 3 pp**
Ava 75%; Ben 72%. $75 - 72 = 3$.
- Answer: 4 points**
 $TD + PAT = 7$; $FG = 3$; $7 - 3 = 4$.
- Answer: 3.7 points**
 $0.4 \times 7 + 0.3 \times 3 + 0.3 \times 0 = 2.8 + 0.9 = 3.7$.
- Answer: 3 : 2**
Divide both parts by 4: 12:8 becomes 3:2.
- Answer: 41 pts; 5.125 pts/trip**
 $5 \times 7 + 2 \times 3 = 35 + 6 = 41$; $41 \div 8 = 5.125$ (or $41/8$).

A · Drive Chart

- Answer: 28 points**
 $7+3+7+0+8+3 = 28$.
- Answer: 50%**
3 TD trips out of 6 is 50%.
- Answer: Drive 2 (3 yds/play)**
Yards/play: 6, 3, 4, —, 6, 4. Lowest is Drive 2.
- Answer: 4.6 yds/play**
 $(6+3+4+6+4) \div 5 = 23 \div 5 = 4.6$.

Quick score

Page 1	_____ / 8
A · Drive Chart	_____ / 4
B · Foxes vs Hawks	_____ / 3
C · Stay At or Above 60%	_____ / 1
Bonus	_____ / 1
Total	_____ / 17

Skills practiced

Unit rates Proportions Percentages Expected value Ratio simplify

Football math

Teaching tip: Have students shade a 10-box strip for "out of 10 trips" before converting to percents. For expected points, write a tiny probability tree (TD / FG / empty) so the multiply-and-add step is visible.

B · Foxes vs Hawks

- Answer: Hawks, by ≈ 6.7 pp**
Foxes $9/15 = 60\%$; Hawks $8/12 = 66\frac{2}{3}\%$. Diff ≈ 6.7 .
- Answer: Foxes 5; Hawks ≈ 5.17**
 $(9 \times 7 + 4 \times 3) / 15 = 75 / 15 = 5$; $(8 \times 7 + 2 \times 3) / 12 = 62 / 12 \approx 5.17$.
- Answer: 9 : 8**
9:8 is already simplest.

C · Stay At or Above 60%

- Answer: 7 TDs**
 $(4+x)/18 \geq 0.60$, so $4+x \geq 10.8$, so $x \geq 7$.
- BONUS Answer: 3.55 points**
 $0.35 \times 8 + 0.25 \times 3 = 2.8 + 0.75 = 3.55$.