

Gridiron Coordinates

The made-up Harbor Hawks are drawing up a passing play, and the field is a coordinate plane. Each grid square is 5 yards by 5 yards.

Name _____

Date _____

COORDINATE TOOLKIT

Ordered pair

(x, y): across,
then up

Distance

$$a^2 + b^2 = c^2$$

Slope

rise + run

Reflect

flip over
a line

DOWN

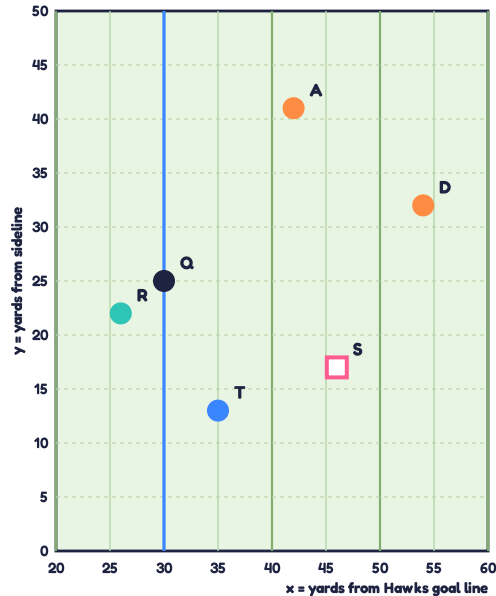
1st

BALL ON

x = 30

PLOT · MEASURE · PASS

THE PLAY CHART



PLAYERS

Q Quinn Avery · QB

A Ari Banks · WR

T Theo Kim · TE

R Remy Diaz · RB

D Dez Moreau · WR

S Sol Grant · Safety

Blue line = line of scrimmage (x = 30).

Circles = Hawks. Square = Comets defender.

Exact spots (between grid lines):

A (42, 41) · D (54, 32) · S (46, 17)

ROOKIE

- 1 What are the coordinates of quarterback **Q**? Write an ordered pair.

WORK SPACE

(_____ , _____)

ROOKIE

- 2 Which player is standing at **(35, 13)**?

WORK SPACE

STARTER

- 3 How many yards **downfield** (in the x-direction) is receiver **A** from Q?

WORK SPACE

_____ yards

STARTER

- 4 Q throws straight to **A**. How long is the pass? Use $a^2 + b^2 = c^2$.

WORK SPACE

_____ yards

PRO

- 5 Q throws straight to **T**. How long is that pass?

WORK SPACE

_____ yards

PRO

- 6 How long is the pass from Q to **D**? Which is longest: Q to A, Q to T or Q to D?

WORK SPACE

_____ yd · _____

ALL-STAR

- 7 What is the **slope** of the line from Q to A? Write a fraction in simplest form.

WORK SPACE

CHALLENGE ★

- 8 The coach flips the play to the other side, reflecting it over the line **y = 25**. Where does A line up now?

WORK SPACE

(_____ , _____)

A Drive Chart Integers

Gains are positive, losses are negative. A penalty against the offense moves the ball back.

PLAY	TYPE	YARDS	BALL ON (x)
1	Run	+7	
2	Sack	-3	
3	Pass	+15	
4	Holding penalty	-10	
5	Pass	+9	

Made-up Harbor Hawks drive.

1 Fill in the **Ball on (x)** column. The drive starts at **x=22**.

2 What is the **net** yardage for the whole drive? _____ yards

3 Add only the **losses**. What integer do you get? _____ yards

4 What is the **mean** yards per play? Write a decimal. _____ yards

B Coordinate Words

Write the word from the bank that matches each meaning. One word is not used.

Word bank: hypotenuse · ordered pair · origin · quadrant · reflection

1 the point (0, 0) where the two axes meet

2 two numbers (x, y) that name one exact spot

3 the longest side of a right triangle

4 a flip that makes a mirror image across a line

C Race to the Ball

Use the play chart on page 1. Q throws deep to D. Can the safety break it up?

1 Find the **midpoint** of the pass from Q to D. That is where the ball is halfway there.

WORK SPACE



(_____ , _____)

2 Comets safety **S** sprints straight to D's spot. How many yards does S run?

WORK SPACE



_____ yards

3 The ball travels **20 yards per second**. How many seconds does the 25-yard pass take?

WORK SPACE



_____ seconds

4 S runs **8 yards per second**. Does S get there before the ball? By how many seconds is the winner ahead?

WORK SPACE



_____ by _____ s

BONUS · YOUR TURN

Design your own pass route. Give the receiver's **ordered pair**, then find the **pass length** from Q. Hint: try a 3-4-5 or 6-8-10 triangle.

- _____
- _____
- _____

Answer Key (for teachers & parents)

Gridiron Coordinates: answers and short steps for every problem. Spots: Q (30, 25), A (42, 41), T (35, 13), D (54, 32), S (46, 17). Bonus answers vary; check the ordered pair and $a^2 + b^2 = c^2$.

Page 1 Problems

- Answer: (30, 25)**
Q is on the blue line $x = 30$, at $y = 25$.
- Answer: Theo Kim (T)**
T sits on the $x = 35$ line, at $y = 13$.
- Answer: 12 yards**
A is at $x = 42$. $42 - 30 = 12$.
- Answer: 20 yards**
Across 12, up $41 - 25 = 16$.
 $12^2 + 16^2 = 144 + 256 = 400$. $\sqrt{400} = 20$.
- Answer: 13 yards**
Across 5, down $25 - 13 = 12$.
 $5^2 + 12^2 = 169$. $\sqrt{169} = 13$.
- Answer: 25 yards, Q to D is longest**
Across 24, up 7. $24^2 + 7^2 = 576 + 49 = 625$.
 $\sqrt{625} = 25$, more than 20 and 13.
- Answer: 4/3**
Rise $16 \div$ run $12 = 16/12 = 4/3$.
- Answer: (42, 9)**
A is $41 - 25 = 16$ above $y = 25$.
Go 16 below: $25 - 16 = 9$. x stays 42.

Quick score

Page 1 Problems	_____ / 8
A · Drive Chart Integers	_____ / 4
B · Coordinate Words	_____ / 4
C · Race to the Ball	_____ / 4
Total	_____ / 20

Skills practiced

Coordinate plane Pythagorean theorem Slope
Reflections Integers Midpoint Rates

Teaching tip: Every pass is a Pythagorean triple (5-12-13, 12-16-20, 8-15-17, 7-24-25), so no calculator is needed. In question 6 kids often add $24 + 7 = 31$; have them sketch the right triangle first.

A · Drive Chart Integers

- Answer: 29, 26, 41, 31, 40**
Start 22: +7, -3, +15, -10, +9 in order.
- Answer: +18 yards**
 $7 - 3 + 15 - 10 + 9 = 18$. Check: $40 - 22 = 18$.
- Answer: -13 yards**
 $-3 + (-10) = -13$.
- Answer: 3.6 yards**
Net 18 yards $\div$ 5 plays = 3.6.

B · Coordinate Words

- Answer: origin**
Where the x-axis and y-axis cross.
- Answer: ordered pair**
Like (30, 25): across, then up.
- Answer: hypotenuse**
The side across from the right angle.
- Answer: reflection**
Not used: quadrant.

C · Race to the Ball

- Answer: (42, 28.5)**
x: $(30 + 54) \div 2 = 42$.
y: $(25 + 32) \div 2 = 28.5$.
- Answer: 17 yards**
S (46, 17) to D (54, 32): across 8, up 15.
 $8^2 + 15^2 = 289$. $\sqrt{289} = 17$.
- Answer: 1.25 seconds**
25 yards $\div$ 20 yards per second.
- Answer: No, the ball wins by 0.875 s**
S needs $17 \div 8 = 2.125$ s.
 $2.125 - 1.25 = 0.875$.