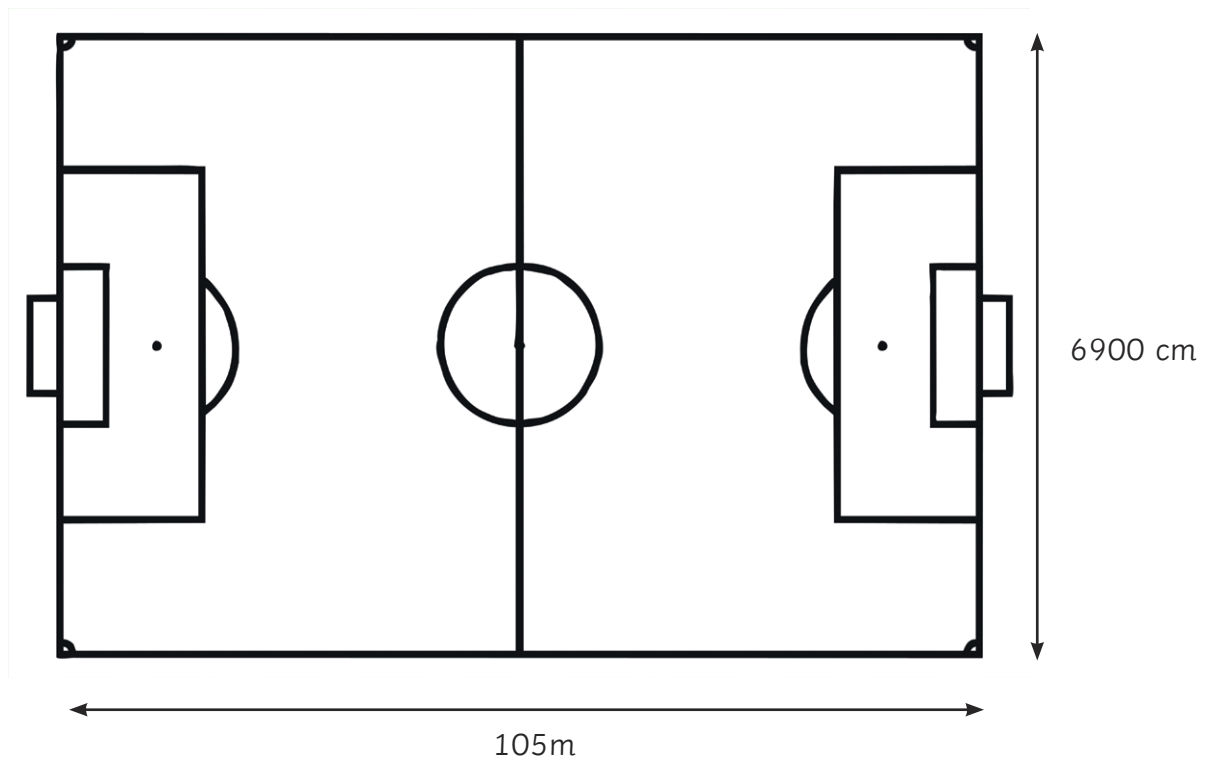# Significant Figures

Calculate the range of possible answers for each FA Cup Final Fact.

Fact	1 Significant Figure	2 Significant Figures	Range of possible answers (To the nearest whole number)
The birth of the FA Cup.	2000	1900	Between 1850 and 1949
On average, the number of matches played per FA Cup year.	400	380	**Between 375 and 389**
The number of trains travelling to the three Wembley Stations per hour.	100	110	**Between 105 and 114**
The distance if all the seating in Wembley Stadium was placed end to end.	50	54	**Between 53.5km and 54.4km**
The span for the arch of the roof.	300	320	**Between 315m and 324m**
The number of steps the winners of the FA Cup must climb on the trophy presentation route.	100	110	**Between 105 and 114**
Last year's attendance at the FA Cup Final.	90000	89000	**Between 88500 and 89499**
The stadium capacity of Arsenal.	60000	60000	**Between 60000 and 60499**
The stadium capacity of Chelsea.	40000	42000	**Between 41500 and 42499**
The number of clubs accepted into the competition.	700	740	**Between 735 and 744**

Challenge Question

Here is a diagram of the football pitch at Wembley Stadium.

The length of the pitch is 105m.

The width of the pitch is 6900cm.

The cost of replacing the grass on the pitch is £300 per 5m².

The Football Association have budgeted £400 000 (to 1 significant figure) to do this. Have they got enough money?
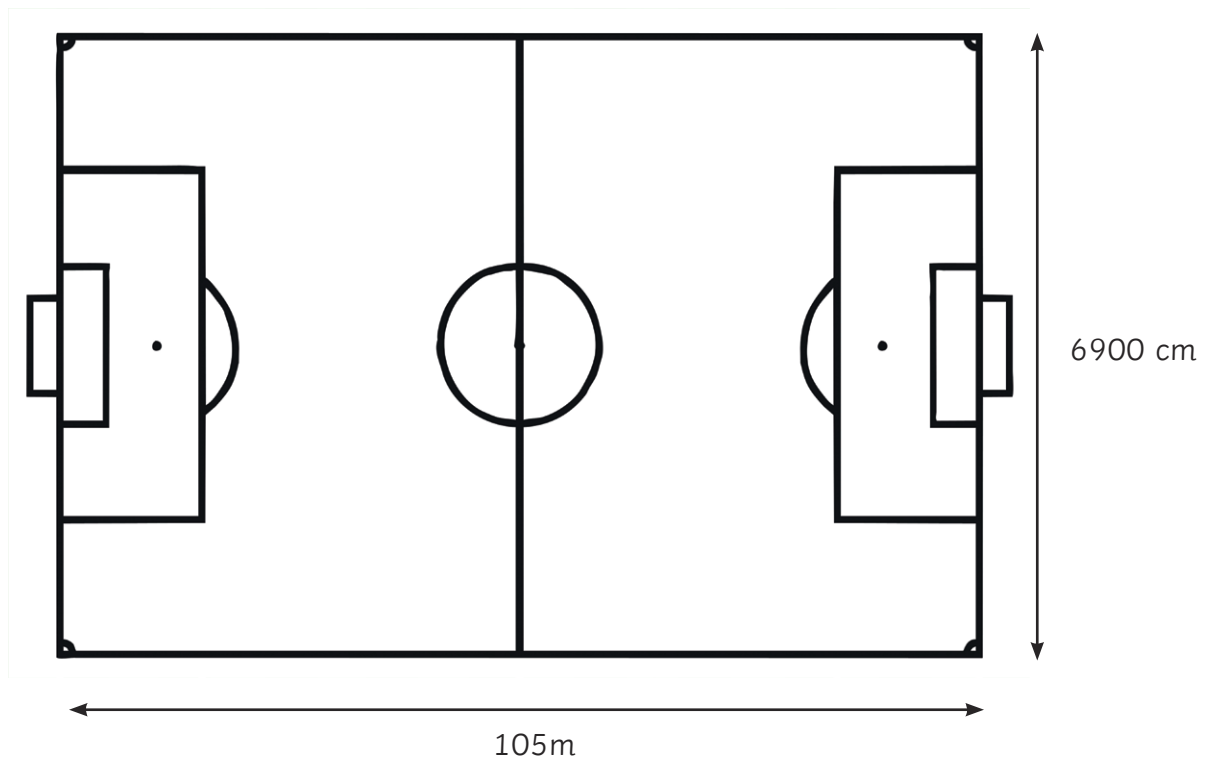
Show your working.

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6900 cm

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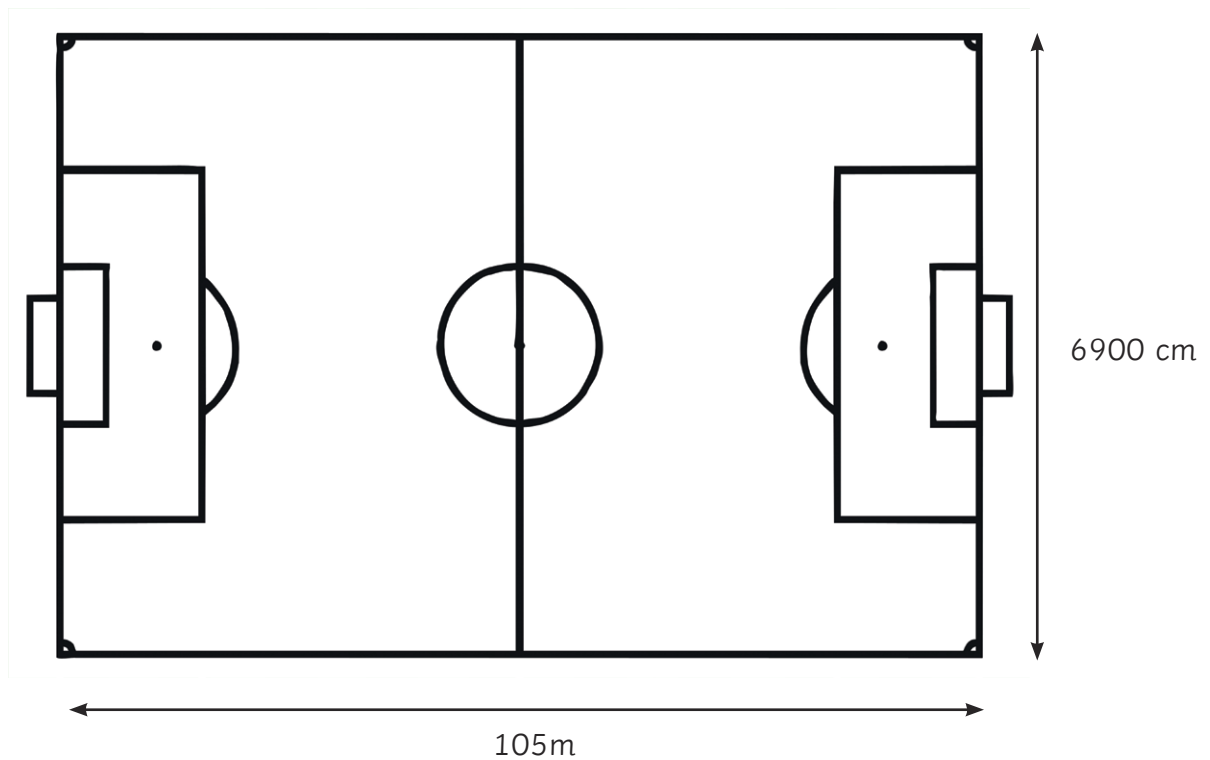
Show your working.

Significant Figures

1) Cut out the cards.

2) Match the fact to its answers by rounding it to 1 significant figure and 2 significant figures.

Fact	1 Significant Figure	2 Significant Figures
The birth of the FA Cup was in 1871.	50	89000
On average, 381 matches are played per FA Cup year.	100	60000
105 trains travel to the three Wembley Stations per hour.	100	1900
If all seating in Wembley Stadium was placed end to end they would cover 54 km.	300	42000
The arch of the roof has a span of 315 metres.	400	740
The winners of the FA Cup must climb 107 steps on the trophy presentation route.	700	380
88619 people attended last year's FA Cup Final.	40000	320
The stadium capacity of Arsenal is 60432.	2000	110
The stadium capacity of Chelsea is 41 841.	60000	110
736 clubs were accepted into the competition.	90000	54

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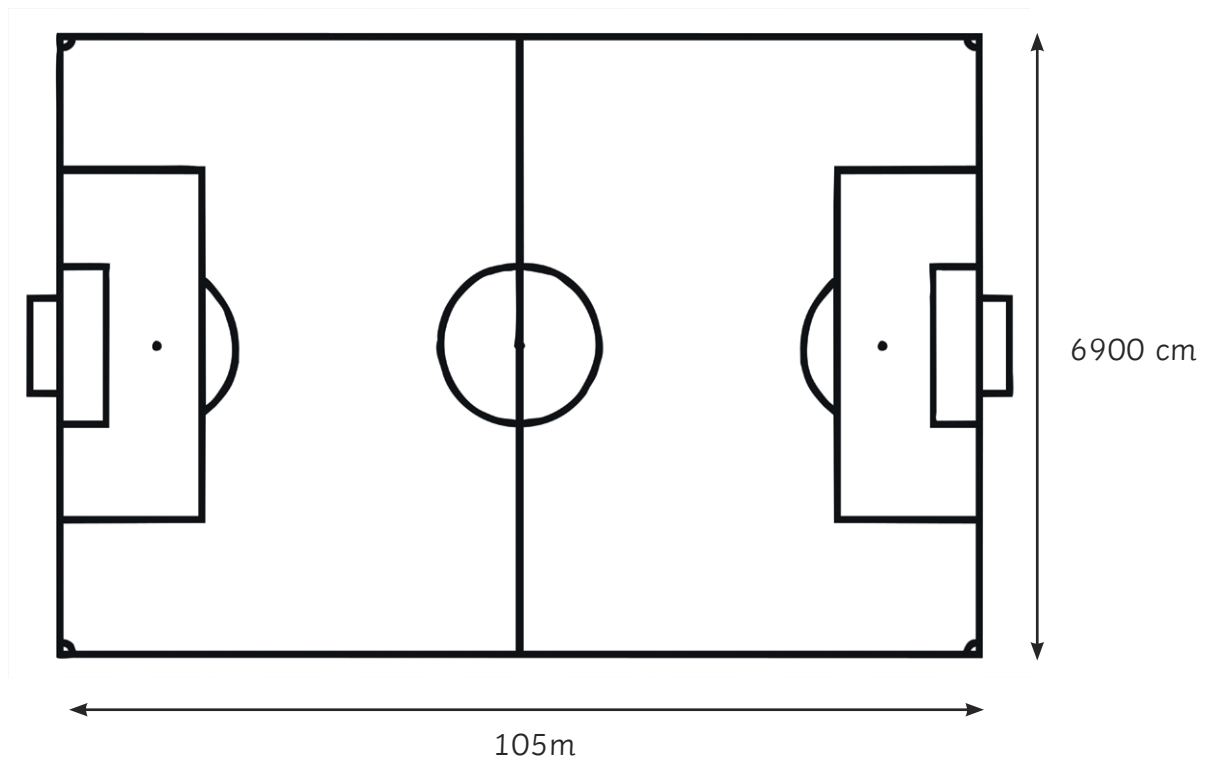
Show your working.

Significant Figures

Round the following FA Cup facts to 1 and 2 significant figures.

Fact	1 Significant Figure	2 Significant Figures
The birth of the FA Cup was in 1871.		
On average, 381 matches are played per FA Cup year.		
105 trains travel to the three Wembley Stations per hour.		
If all seating in Wembley Stadium was placed end to end they would cover 54 km.		
The arch of the roof has a span of 315 metres.		
The winners of the FA Cup must climb 107 steps on the trophy presentation route.		
88619 people attended last year's FA Cup Final.		
The stadium capacity of Arsenal is 60432.		
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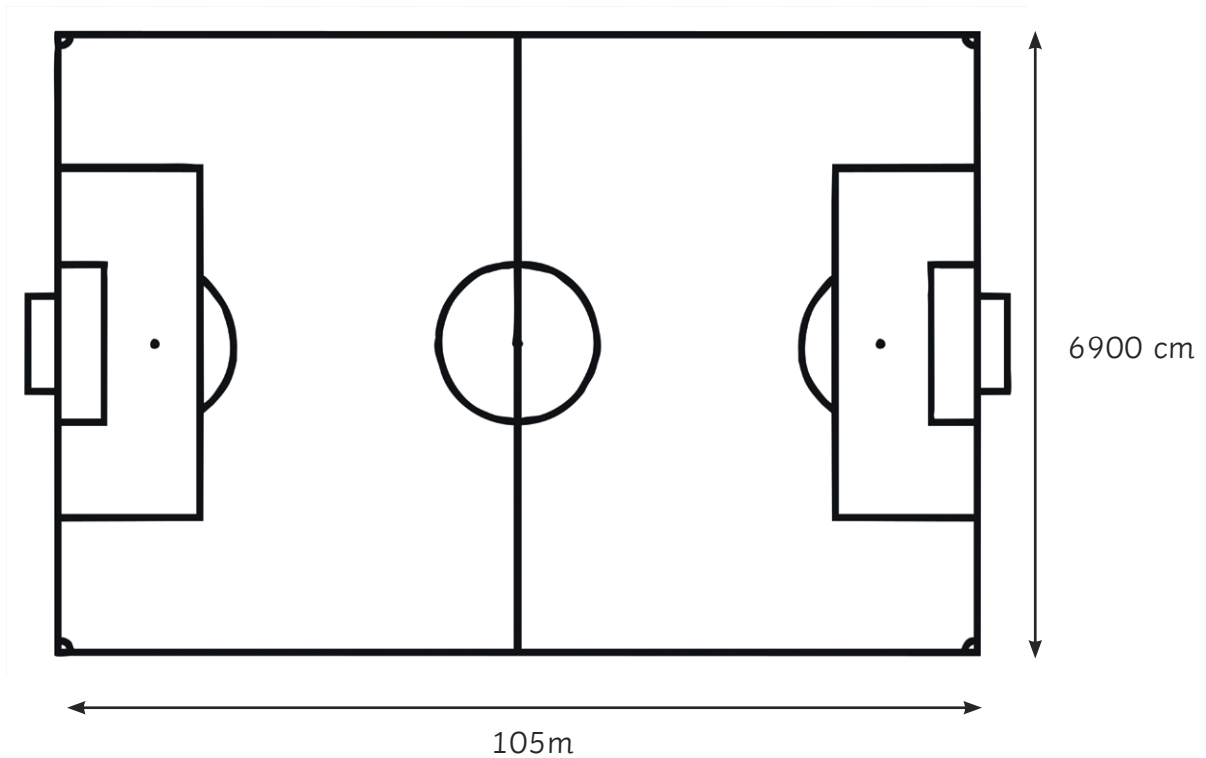
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105 trains travel to the three Wembley Stations per hour.	100	110
If all seating in Wembley Stadium was placed end to end they would cover 54 km.	50km	54km
The arch of the roof has a span of 315 metres.	300m	320m
The winners of the FA Cup must climb 107 steps on the trophy presentation route.	100	110
88619 people attended last year's FA Cup Final.	90 000	89 000
The stadium capacity of Arsenal is 60432.	60 000	60 000
The stadium capacity of Chelsea is 41 841.	40 000	42 000
736 clubs were accepted into the competition.	700	740

Challenge Question Answers

Here is a diagram of the football pitch at Wembley Stadium.

The length of the pitch is 105m.

The width of the pitch is 6900cm.

The cost of replacing the grass on the pitch is £300 per 5m².

The Football Association have budgeted £400 000 (to 1 significant figure) to do this. Have they got enough money?

Show your working.

6900 cm = 69 m

Area of pitch = 69 × 105 = 7245m²

Cost per square metre = £300 ÷ 5 = £60

Cost of grass = 7245 × 60 = £434 700.

They might have enough as the range of their rounded budget is between £350 000 and £449 999.

FA Cup Final
Rounding to Significant Figures

Learning Objective

- To be able to round to significant figures.

Success Criteria

- To recall and use the rules of rounding up and down.

- To be able to round any integer to a significant figure.

- To understand and explain the difference between rounding to decimal places and rounding to significant figures.

Starter: What's Your Capacity?

Rounding Rules

What are our rounding rules?

4 or less, let it rest.

5 or more, let it soar.

Significant Figures

Sometimes we do not always need to give detailed answers to problems – we can estimate an answer.

To do this, we can use significant figures.

In maths, **significant** means 'to have value'.

Examples

In the number 2795, the 2 is the most significant digit, because it tells us that the number is 2 thousand and something.

However, in the number 0.052, the 5 is the most significant digit.

Significant Figures

When we round to significant figures, we start counting as soon as we reach a number that is not zero.

Round 37 to 1 significant figure.

1 significant figure

To work out if the 30 will remain the same or round up to 40, we need to look at the column to its right (the units column).

In this case, the number next to it is worth 7 units, so we round our 30 up to 40.

Round 37 to 1 significant figure = **40**

Significant Figures

Round 153 to 2 significant figures.

| 1 significant figure | 2 significant figures |

Remember: we need to look to the right of the '50' to find out if this will remain 50 or be rounded up to 60.

On this occasion, because the number to its right is a 3, it means that 153 rounded to 2 significant figures is **150**.

Significant Figures

What would 153 rounded to 1 significant figure be?

1 significant figure

We need to look to the right of our '100' to find out if this will remain the same or be rounded up to 200.

On this occasion, the number to its right (in the tens) is a 5, therefore 100 will need to be rounded to 200.

153 rounded to 1 significant figure is **200.**

Quick-Fire Significant Figures

Answer the following questions by applying your understanding of rounding significant figures.

1) Round 45 to 1 significant figure.   **50**

2) Round 192 to 2 significant figures.   **190**

3) Sally says that 136.248 rounded to 2 significant figures is 136.25.

   a) Explain the mistake that Sally has made.
      She has rounded to 2 decimal places instead of 2 significant figures.

   b) What is the correct answer?
      140

Plenary: What's the Difference?

Explain the difference between rounding to significant figures and rounding to decimal places.
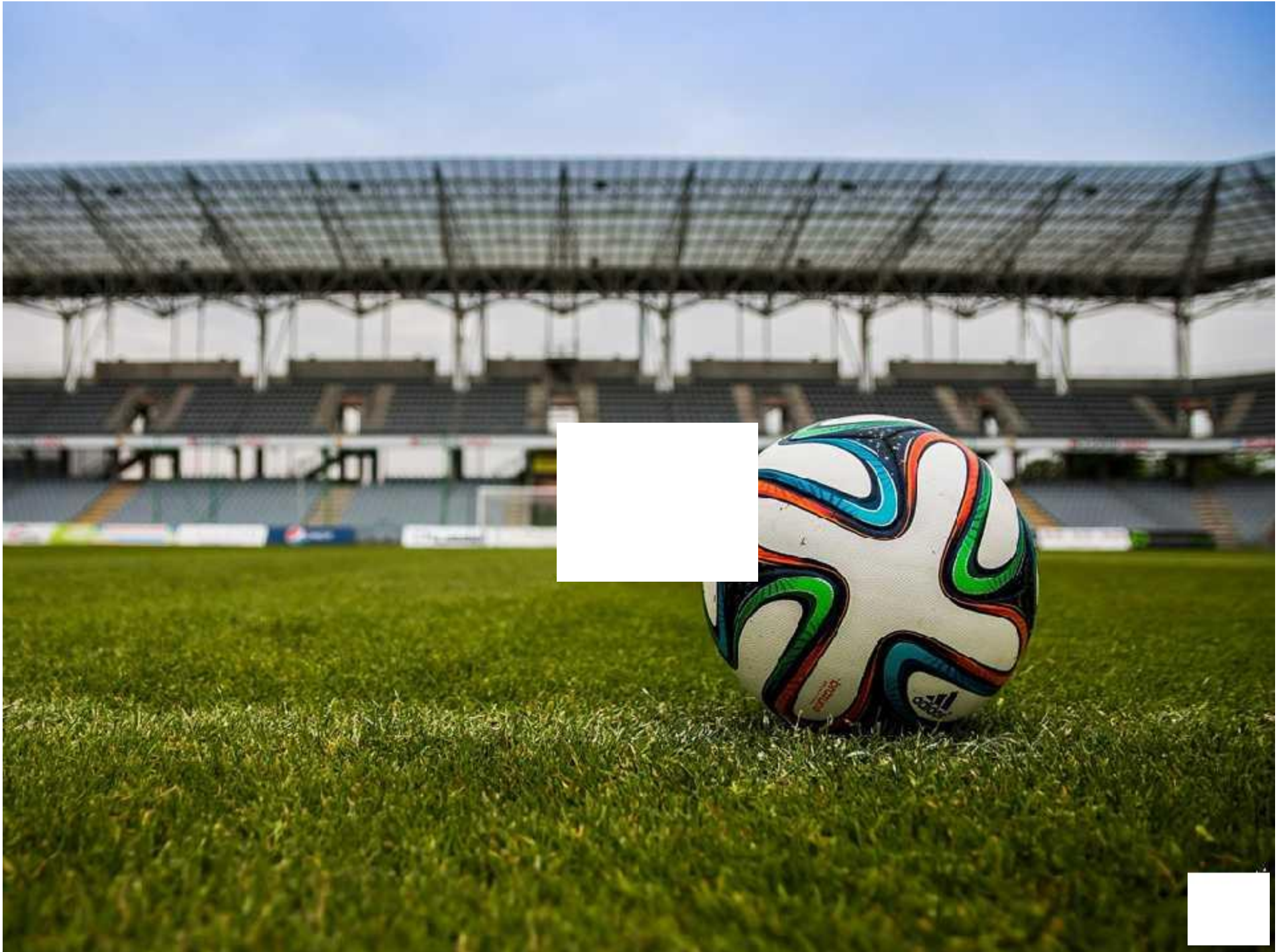
Extension: Can you link your explanation to the FA Cup Final?

Plenary: Significant Figures Extension

Round 0.00287 to 2 significant figures.

Learning Objective:	To be able to round to significant figures.
Success Criteria:	• To recall and use the rules of rounding up and down.
	• To be able to round any integer to a significant figure.
	• To understand and explain the difference between rounding to decimal places and rounding to significant figures.
Context:	Using the FA Cup Final to contextualise rounding integers to a significant figure, this lesson could be used as the introductory lesson in a sequence of lessons on rounding or in preparation for a lesson on estimation. Students should be able to recall when to round up and when to round down.

Starter

What's Your Capacity?

Using the FA Cup Final as a theme, the starter is a fun and alternative way of practicing some numeracy skills.

You will need the **What is My Stadium Capacity? Activity Sheet** for the starter. Prior to the lesson, cut out the questions and place them around the room. Each student will need a card with a football team on. The questions vary in difficulty so when handing teams out to students, differentiation could be achieved by thinking about the level of difficulty you are giving to each student.

When students have received their team, they need to go and find their question. They can then bring this back to their seat and calculate the answer. As an extension, ask students to 'convince' you why their answer is correct by proving their answer with a method. Alternatively, students could write another question to match the answer. This could be made more difficult by including more than one operation or thinking about BIDMAS.

Main Activities

Rounding Rules

You can pose the question 'What are our rounding rules?' to the whole class and take suggestions, or you may wish for students to write their answers down on a whiteboard in a 'show me' type activity.

Following this, the students could play a teacher-led game:

• Pick a student to start and ask them to stand behind the chair of another student.

• Pose a rounding question to the pair of students. For example, "Round 48 to the nearest 10." or "Round 245 to the nearest 100." The first person to answer the question correctly, wins.

• If this answer is from the standing student, they will then move on so they are standing behind the next student sitting down. If the answer comes from the sitting student, they then stand up and move to stand behind the next person sitting down. The student who was standing up will then go and sit back down.

• The aim of the game is to see which student can remain standing for the greatest number of rounds.

Significant Figures

Slides 5, 6, 7 and 8 are designed as whole class, teacher-led activities to go through how to round an integer to a significant figure. You should use your discretion as to the pace of delivery as well as whether the questions should be posed to the whole class first before giving them the answer. This will depend on the class ability as well as their confidence with rounding. You should emphasise the importance of the difference between rounding to decimal places and rounding to significant figures. Address the misconception that they are the same throughout the demonstrations.

Quick-Fire Significant Figures

These quick-fire questions can be used as an assessment for learning tool to assess the understanding of student learning and to, again, address the difference between rounding to decimal places and rounding to significant figures. You could encourage a whole class discussion about the answers. A clear and confident explanation should be heard at this point. Following this activity, students could complete **Significant Figures Activity Sheet**. These are a set of differentiated activity sheets using the FA Cup Final as a context for rounding integers to 1 and 2 significant figures.

Plenary

What's the difference?

The plenary is aimed at assessing students' mastery of the skill as well as ensuring that students have a clear understanding of the difference between rounding to decimal places and rounding to significant figures. The activity could be completed independently, in pairs or as a small group and should include a clear and definitive explanation. Little teacher support should be given at this point.

Significant Figures Extension

The second part of the plenary is intended to be an extension and enable students to really apply their understanding of significant figures and its definition. This can be posed to the whole class or worked on in pairs or groups. At this point, you should look for the students to produce a concise definition of significant figures and use this to reason an answer.

What Is My Stadium Capacity?

Instructions

1. Each card will need to be cut out.

2. Hand out the team name cards to students.

3. Place the question cards around the room.

4. Students will locate their team and complete the necessary calculation to find out the capacity of their stadium.

5. As an extension, pupils could then write their own question for the capacity of their stadium using at least 2 operations.

Arsenal	**Leicester**
Blackburn	**Lincoln City**
Burnley	**Manchester City**
Chelsea	**Manchester United**
Chesterfield	**Middlesbrough**
Fulham	**Millwall**
Huddersfield	**Sutton**

Tottenham Hotspur	Derby County
Wigan	Leeds United
Watford	Crystal Palace
Plymouth Argyle	Bristol City
Liverpool	Newcastle United
Coventry	Blackpool
Oxford United	Brentford

What Is My Stadium Capacity?

Arsenal = 15108 × 4

What Is My Stadium Capacity?

Chesterfield = 52520 ÷ 5

What Is My Stadium Capacity?

Blackburn = 94101 ÷ 3

What Is My Stadium Capacity?

Coventry = Half 65218

What Is My Stadium Capacity?

Blackpool = 60683 ÷ 3.5

What Is My Stadium Capacity?

Crystal Palace = 15935 + 9521

What Is My Stadium Capacity?

Brentford = 11347.4 + 952.6

What Is My Stadium Capacity?

Derby County = 11199 × 3

What Is My Stadium Capacity?

Bristol City = 500 × 54

What Is My Stadium Capacity?

Fulham = 6425 × 4

What Is My Stadium Capacity?

Burnley = 4509.2 × 5

What Is My Stadium Capacity?

Huddersfield = 17568 + 6932

What Is My Stadium Capacity?

Chelsea = 48766 − 6925

What Is My Stadium Capacity?

Wigan = 25283.23 − 145.23

What Is My Stadium Capacity?

Leeds United = 46842 − 8952

What Is My Stadium Capacity?

Millwall = 21041.2 − 895.2

What Is My Stadium Capacity?

Leicester = 13000 × 2.5

What Is My Stadium Capacity?

Newcastle United = 261770 ÷ 5

What Is My Stadium Capacity?

Lincoln City = 9474 + 653

What Is My Stadium Capacity?

Oxford United = 5000 × 2.5

What Is My Stadium Capacity?

Liverpool = 6759.25 × 8

What Is My Stadium Capacity?

Plymouth Argyle = 2225 × 8

What Is My Stadium Capacity?

Manchester City = 49472.2 + 5624.8

What Is My Stadium Capacity?

Sutton = 1671 × 3

What Is My Stadium Capacity?

Manchester United = 48543 + 27188

What Is My Stadium Capacity?

Tottenham Hotspur = 14502.8 × 2.5

What Is My Stadium Capacity?

Middlesbrough = 41663 − 692

What Is My Stadium Capacity?

Watford = double 10988.5

Answers

Team	Stadium Capacity
Arsenal	60 432
Blackburn	31 367
Blackpool	17 338
Brentford	12 300
Bristol City	27 000
Burnley	22 546
Chelsea	41 841
Chesterfield	10 504
Coventry	32 609
Crystal Palace	25 456
Derby County	33 597
Fulham	25 700
Huddersfield	24 500
Hull	25 404
Leeds United	37 890
Leicester	32 500
Lincoln City	10 127
Liverpool	54 074
Manchester City	55 097
Manchester United	75 731
Middlesbrough	34 742
Millwall	20 146
Newcastle United	52 354
Oxford United	12 500
Plymouth Argyle	17 800
Sutton	5013