

**Task description**

Pupils determine how long it would take a panel of judges if they saw every act that auditioned for the 'Z factor' programme.

**Suitability** National Curriculum levels 3 to 8

**Time** 45 minutes to 1 hour

**Resources** Paper and calculator

**Key Processes involved**

- **Representing:** Simplify the problem by making appropriate assumptions.
- **Analysing:** Combine assumptions and work logically to solve the problem.
- **Communicating and reflecting:** Throughout, present arguments and reflect on findings, recognising the impossibility of the scenario presented.

**Teacher guidance**

You could start by showing pupils relevant pictures or videos from <http://xfactor.itv.com/>

- *For the TV programme, there are thousands of people wanting to audition. How do they decide which acts get through this first set of auditions?*
- *To answer the question, you will need information that is not given, so you will have to make assumptions (sensible guesses) – and explain them.*

The task requires multiplicative calculations involving time.

The following probing questions may be helpful:

- *What do you need to know? As you work through the problem, write down the questions for which you need answers*
- *Make sensible guesses for the answers; what assumptions are you making? Why?*
- *Have you decided to ignore any factors? Why?*
- *What does your solution tell you about the auditions for the Z Factor?*

Two key assumptions are needed: 1) How long an audition lasts; 2) The number of hours in a judges' working week. Pupils' assumptions should be vaguely realistic! Pupils might work backwards, assuming all auditions are seen and finding how long each one would need to be; this does not answer the question asked, but it does show insight into the situation and the mathematics is equally complex.

## The Z Factor

There is a very popular talent show on television. Four judges vote on each act they see.

Last year, about **182 000 people (or acts)** auditioned for the first round of the show.



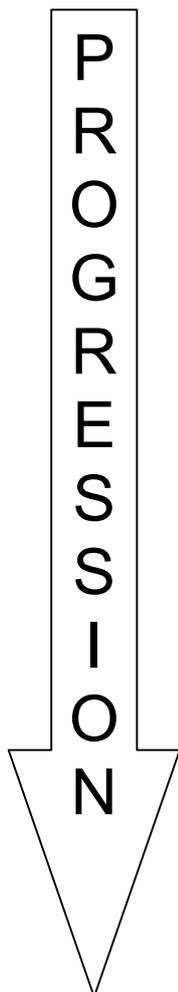
If the judges saw every person who auditioned (which they don't!), about how many **weeks** would this take?

What other information do you need to answer the question?

Make this information up, by making sensible guesses. Explain your guesses

## Assessment guidance

### Progression in Key Processes



Representing	Analysing	Communicating and reflecting
Relevance of approach and quality of assumptions made	Accuracy and technical demand of calculations	Quality and clarity of communication of all aspects of the problem, including methods and answers
Shows some insight by considering a key question, eg 'How many auditions in a day?' <span style="color: #2980b9;">Pupils A+B</span>	Shows a relevant calculation <span style="color: #2980b9;">Pupils A+B</span>	Writes question(s) and answers clearly, even if it is difficult to follow the calculation(s) <span style="color: #2980b9;">Pupils A+B and D</span>
Makes both key assumptions, even if there is irrelevant other work	Calculations are accurate and relevant, even if simplistic	States assumptions clearly and shows methods and reasoning sufficiently clearly for them to be followed
Makes both key assumptions realistically, and with little or no irrelevant other work <span style="color: #2980b9;">Pupils C and D</span>	Show multi-step calculations which are effective <span style="color: #2980b9;">Pupil C</span>	States assumptions clearly, with methods that are explicit and 'flow' <span style="color: #2980b9;">Pupil C</span>
Throughout the task there is clear, effective and concise communication that builds to an effective solution. In addition, there is evidence of reflection or additional insight ( <span style="color: #2980b9;">Pupil D</span> ), eg the implication of the number of weeks being greater than one year although the show is held yearly, or thinking of alternative approaches such as group auditions		

## Sample responses

### Pupils A and B

My question	My answer (my best guess)
How many people audition a day?	<del>750</del> 120
How many people a month?	<del>6000</del> 3600
How long is each audition? <i>Teacher prompted</i>	3 min
How many in a week?	<del>1500</del> 720

Use your answers to work out how many weeks it would take if the judges saw every person who auditioned.

~~30.5 weeks half a year~~

~~182000 = 1800~~

~~= 252.5 week~~

~~182000~~

~~3600~~

250  
x 7  
1750  
x 12  
5020

30.5 weeks

20  
1200 7

### Comments

Pupils A and B made unsupported assumptions, first of 250 then of 120 auditions/day. People per month has been reworked, even though this is irrelevant to the task. Their correct working of  $182000 \div 720$  has been crossed out to be replaced by an unsupported 30.5 weeks. Although the pupils show some arithmetic skill, they struggle with the complexity of the problem and its multi-step nature.

### Probing questions and feedback

- *When you work on a problem, think about what you know ... and then think about what you can work out from that. Break the task down into little steps.*
- *You said each audition lasts 3 minutes. So how many auditions in one hour? Then how many hours a day do you think the judges work? ... and so on ...*

The pupils would benefit from further opportunities to apply mathematics within a real-life scenario. They should also work on problems that are complex enough to need to be broken down into steps.

Pupil C

My question	My answer (my best guess)
182,000 people 1hr 12 minutes (skt)	18 people (4 mins each)
$182,000 \div 18 =$	10,112 shows x
7hrs (1hr lunch break (8hrs))	
1hr = 30 auditions	2mins each
$30 \times 7 =$ Auditions in a day	210 auditions
$182,000 \div 210$ (How many days?)	867

Use your answers to work out how many weeks it would take if the judges saw every person who auditioned.

$867 \div 5$ (How many 5 day weeks?)	174
174 5 day weeks (All auditions)	
174 5 day weeks = 3.4 weeks.	

Comments

Pupil C began by considering the number of auditions per television show, but abandoned that without prompting. From then on, his assumptions are appropriate and stated and he communicates his working clearly - although the questions are not listed. The calculations are accurate, rounding up in each case (which could be appropriate given the context). His logic is mostly identifiable from his working and, apart from his slip in recording years as weeks for his final value, he reaches a realistic conclusion. This slip may explain why he did not reflect on the impossibility of his answer.

Probing questions and feedback

- You wrote 3.4 weeks, but your calculations gave 3.4 years! What do you think that means? Is it possible for the auditions to take 3.4 years? If not, why not?
- In general, always reflect on the realism of your answer to a real problem.

Pupil C would benefit from another opportunity to reflect on outcomes, interpreting solutions in different contexts to realise that maths is more than finding ‘the right answer’.

Pupil D

My question	My answer (my best guess)
how long is each audition?	3 mins
how many per hour?	20
how many people per day?	480
how ma people <del>per</del> week?	3,360
How many hours a day do they work?	16 hours
how long lunch break do you have?	1 hours

Use your answers to work out how many weeks it would take if the judges saw every person who auditioned.

~~3~~ about 3 mins each audition  
 even if they never stopped working it would take them 1 year 2 weeks 1 day  
~~20~~ 20pph  
~~480~~ 480 ppd  
 16 hours and 26 mins  
~~3360~~ 3360 ppw  
 2 years 8 weeks  
 1h 2h  
 8am  
 12h  
 13h  
 17h  
 2h 10m  
 1h 20m  
 762  
 758  
 138  
 0.05 0.01  
 0.10 0.01 0.05

Comments

The first four rows of the table show that Pupil D considered how long it would take to see all the auditions if the judges ‘never stopped working’; this suggests a deliberate strategy which shows insight into the task. Although the working of  $182000 \div 3360$  is not shown, she correctly converts weeks into years, weeks and days. She then appears to make more realistic assumptions about the working day, but she does not show how she gets to 2 years, 8 weeks etc. She is clearly comfortable with range and content, but her process skills are not as good; in particular, her communication skills are so poor that it is difficult to form an effective judgement on her performance.

Probing questions and feedback

- Think how to set out your work more effectively. In real life, solutions need to be clear so that others can understand what you have done and why. Your rough work is mixed up with your solution, making it hard to understand your thinking.

Pupil D would benefit from further opportunities to present her maths clearly. Several of the Bowland tasks, eg *Product Wars* and *Reducing Road Accidents*, require presentation skills and would create an audience for effective communication.