SiS

Moving pictures: teach speed, acceleration, and scale with photograph sequences

Activity 1 worksheet

Step	Task	Answer*
1	Draw a vertical line through the same feature of the aircraft in the first and last pictures. You can choose whatever feature you wish.	–
2	Measure the distance between the two lines drawn in step 1 as accurately as you can and record the length in millimetres. You should repeat the distance measurement to check your value, and you might even ask other students for their measurements to compare with yours. It is good practice for scientists to compare their measurements with those obtained by others.	
3	In the picture sequence shown, the interval between each frame is 0.33 s. What is the total time between the first and last pictures? (Remember to count the number of intervals, not the number of pictures.)	
4	Calculate the speed of the aircraft **in the pictures** by dividing the distance you measured in step 2 by the time interval from step 3. Don't forget to include the appropriate units.	
5	What is the magnification factor that would enlarge the aircraft in the picture up to its real-life size? To answer this, start by measuring the length of the aircraft in the pictures, in millimetres.	
6	The real-life length of the aircraft is 33.84 m. Convert this number into millimetres.	
7	To calculate the enlargement factor, divide the real-life length of the aircraft (mm) by its measured length from the pictures (mm).	
8	Calculate the real-life take-off speed of the aircraft by multiplying the picture-scale speed (step 4) by the enlargement factor (Step 7). Make sure that you state the correct units for this speed.	
9	Convert the take-off speed (step 8) into m/s.	
10	Extension task: although m/s is the usual laboratory form for speed, and uses the correct SI unit, the speeds of large vehicles are commonly given in km/h. For an additional challenge, convert your answer from step 9 into km/h.	

* Always include the appropriate units in your answers.