

Year 6 Lesson Guide

Think, Solve, Succeed: Maths and Careers in Action

Context

This primary school resource aims to extend children's understanding of the job opportunities that await them in their local community and beyond. It particularly stresses the value of applying mathematics in real-life employment contexts, both to further their view of the relevance of mathematics and to increase the sense of fulfilment in undertaking meaningful employment. Positioned on this backdrop, the resource comes as one of a series of lessons that provide a school with an engaging and impactful dimension to their 'problem-solving' curriculum. Central to the experience children gain from the resource is the sense of visiting a local business or organisation; in this case, Komatsu, and we extend our thanks to them.

This resource has been made in collaboration between North East Combined Authority, Winning With Numbers, Komatsu UK, Bloemfontein Primary School and Greenland Community Primary School.



North East Combined Authority Careers Team

Did you know that by the age of five and six, children begin to form career-limiting perceptions based on factors such as their gender and background? Career related learning in a primary setting is about exploring how we open up possibilities, broaden horizons and help children and their families see that anything is possible. Through its Primary Network, the North East Combined Authority is supporting primary schools in our region to create meaningful careers-related learning that will raise aspirations, challenge stereotypes and help children connect the classroom to the world around them. This offer is entirely free to all schools in the North East.

By joining the Primary Network, your school will benefit from one-to-one support to undertake a careers education self-assessment audit and to develop a careers action plan.

In addition to individual support, schools also have access to:

- Regular network meetings (both local and regional) to help develop effective communities of practice
- CPD and training opportunities
- Access to the North East Ambition website, containing resources, case studies and links to careers-related learning providers.

To join the Primary Network, email:
goodcareers@northeast-ca.gov.uk



Winning With Numbers

Winning With Numbers is a number curriculum and learning platform that ensures all children are fluent and confident with number. Winning With Numbers is a 'Phonics for Maths' approach used by schools across the country. It provides a school with access to a structured and systematic programme, ensuring every child acquires basic and essential number fluency. This primary maths programme identifies 300 pieces of number knowledge and puts them in a straight-line sequence of learning. All 300 parts come with a comprehensive suite of digital teaching, learning and training resources.

For more information visit:

www.numbers.com or email WWN@hardingeducation.com



Komatsu

Komatsu is renowned for building machines that meet societal needs. Initially established to provide jobs for the local community, Komatsu has grown into a global company with a diverse workforce. They innovate in technology, creating smart construction equipment, autonomous mining trucks, and even conceptualizing lunar excavators. Komatsu's products support essential industries like forestry, construction, and mining. Their commitment to community and sustainability drives their mission to create value together, ensuring a future where people, businesses, and the planet thrive.

Year 6

This resource centres on the use of a video that teachers can play in class. The video takes the children through the intentions described above and culminates in a virtual visit to the Komatsu plant where we meet an employee called Nathaniel. The children are tasked with supporting Nathaniel in his work. This necessitates some problem-solving and reasoning, as well as making 'real-life' considerations regarding the context. Teachers are urged to pause the video where suggested, allowing children space to think through each part of the scenario for themselves. The notes below can be used as a prompt for the teacher in 'being ready' to support children who need guidance to solve the problems. Naturally, teachers are encouraged to scaffold, adapt and extend the activities to suit their own children's needs, asking children to represent their thinking using a variety of images, symbols and words. Much of the expected thinking can be revisited, strengthening the learning, by altering the numbers or the employment scenarios; asking, 'What if...?'.

Profiles and information about the jobs mentioned in this resource can be found by searching the [National Career Service Explore Careers](#) website. This can be used to facilitate further discussion with pupils about jobs that they are interested in.

Year 6 National Curriculum links

Y5/6 NC introduction

Pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation.

Statutory

- Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit
- Round any whole number to a required degree of accuracy
- Solve number problems and practical problems that involve the above
- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy
- Solve problems involving addition, subtraction, multiplication and division

Non-statutory

Pupils should consolidate their understanding of ratio when comparing quantities, sizes and scale drawings by solving a variety of problems. They might use the notation a:b to record their work.

Pupils both encounter and draw graphs relating two variables, arising from their own enquiry and in other subjects.

Pupils practise addition, subtraction, multiplication and division for larger numbers.

Pupils round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.

Pupils explore the order of operations using brackets; for example, $2 + 1 \times 3 = 5$ and $(2 + 1) \times 3 = 9$.

Discussion Opportunity

What is the difference between manufacturing and advanced manufacturing?

What type of skills do you think a production engineer would need to do their job well?

How might the introduction of robots affect jobs at the Komatsu site?

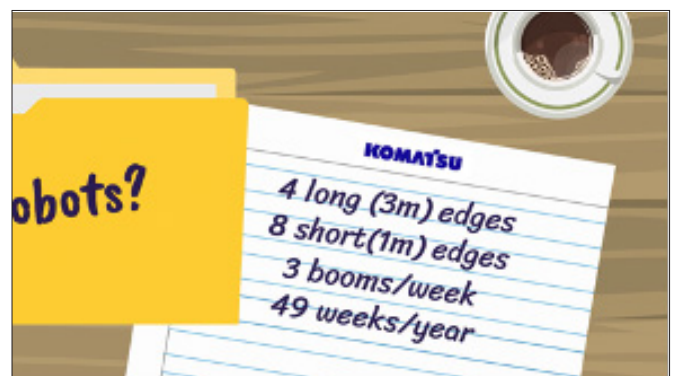
Pause 1: Pausing the video at this point allows us to clarify the task as it is laid out so far, checking children have grasped the overall idea of the professional dilemma. What questions should Nathaniel ask?

Pause 2: What questions should Nathaniel ask? How much does it currently cost for people to weld the booms? How much does it cost to buy a robot? What other costs will the robots bring? (robot programmer, maintenance, risk of breaking) Given initial cost, will it save money? Maybe not in year 1, but maybe in the future it will have saved money... by which date will it start to save money? Will the welding quality be as good? Can the robots do all the welding necessary? etc.

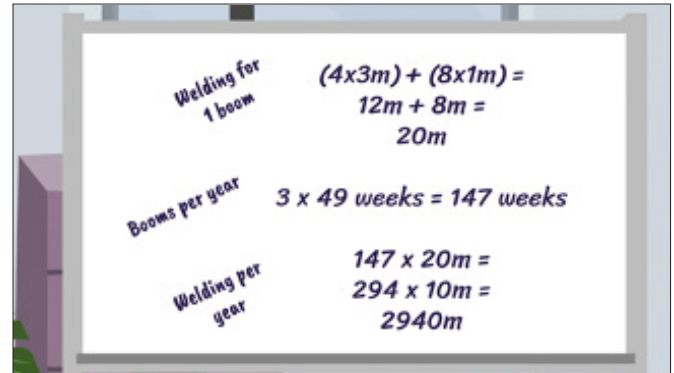
The main question that needs to be addressed is that real people could lose their jobs if robots are employed. This is a wide discussion since it is a global issue, running for some time, and gathering more pace due to the ongoing technological advancements appearing and still to appear through AI.

Pause 3: Children should now clarify the further information we now have:

- Welding needed for 1 boom: $(4 \times 3\text{m}) + (8 \times 1\text{m}) = 12\text{m} + 8\text{m} = 20\text{m}$
- 3 Booms per week: $3 \times 20\text{m} = 60\text{m}$
- 49 weeks per year: $49 \times 60\text{m} = 2940$



Pause 4: Note, how the video plays from pause with a slightly different model of calculating, yet ending with the same outcome of course. Ask children to explain the equations back into the context of the amount of welding.



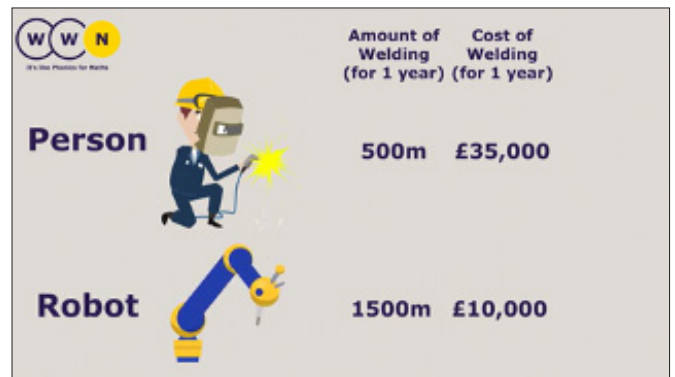
Pause 5: Consider the different costs of people and robots. Ask children to take the lead making their own calculations and considerations.

People Welding Costs

- When ready, support learners by noting that 1 welder can weld 500m in one year, and we already know we need 2940m of welding.
- How many welders are needed? [6]
- Look at how much it costs people to weld.
- Nathaniel has to pay them £35000 each.
- $6 \times 35,000 = 210,000$
- So, £210,000 wages.

Robot Welding Costs

- 1 robot can weld 1500m in 1 year. So, 2 robots needed.
- They cost £10,000 to run. So, $2 \times £10,000 = £20,000$
- So, £20,000 for robot welding costs.
- Robots are far cheaper. What is the difference in welding costs for 1 year? [£190,000]
- As we build up the calculations, ask children to recall what we are still yet to consider (inc. robot running costs and robot purchase costs).

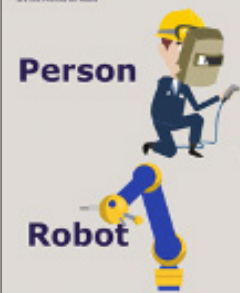


	Amount of Welding (for 1 year)	Cost of Welding (for 1 year)
Person 	500m	£35,000
Robot 	1500m	£10,000

Pause 6: The calculations come to an end here. We now know the robot programmer would need £50,000 per year, and so the saving of having robots from the previous stage above (£190,000) is now only £140,000...although still high.

However, to buy 2 robots would cost £300,000.

Therefore we would make a loss of £160,000 in the first year.



	Amount of Welding (for 1 year)	Cost of Welding (for 1 year)	Cost to buy
Person	500m	£35,000	£0
		+ £50,000 (programmer)	
Robot	1500m	£10,000	£150,000

Extension Opportunity

Even though they make a loss in their first year, what would happen in the second and third year?

Projection of savings with 2 new robots:

- Year 1: spend 300,000 save 140,000
- Year 2: start year with 160,000 loss, but save 140,000, end year with 20,000 loss
- Year 3: start year with 20,000 loss, but save 140,000, end year with 120,000 savings
- Financial conclusion; by end of Year 3 robots had become more cost effective.

Discussion Opportunity

- Is the cheapest solution always the best? What would be the impact of your decisions on jobs?

