

GEARS

**Science, Technology,
Engineering & Mathematics Activities**



Sandra Bishop

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Lesson plans based on using Gears!
Gears! Gears!® Manufactured by
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Foreword

Children of all ages enjoy the challenge of building and constructing. They love the opportunity to play and discover, while learning at the same time. Often they are so engrossed in the task at hand they are not aware that they are, in fact, learning some very early, sound and basic scientific, technological, engineering and mathematical concepts. *Gears: Science, Technology, Engineering & Mathematics Activities* will help guide students in the early learning to primary levels as they begin to grasp the concepts of STEM-focused instruction.

The lessons in this book can be used with Australian Curriculum: Mathematics, Science and Technology instruction at the Foundation to Year 2 level. They are sequential and designed to give the children a lot of fun while discovering for themselves some interesting concepts. The children are actively engaged as learners experiencing many ideas relating to gears. They look in detail at the direction in which gears spin, the various sizes of gears, combinations in which bases can be arranged and the effects that various combinations have on spinning directions. They look at the varying attributes while sorting and classifying as well as beginning early work on building an understanding of ratio. They have the opportunity to record results on a table/spreadsheet, as picture graphs, wall stories etc.

All of this investigative discovery gives students the opportunity to design, produce and evaluate a working model of their own and then as a whole class designing a working mural.

The final phase in this series of lessons gives students the opportunity to investigate gears in the environment. The students investigate their home environment looking for gears, thus placing this work in a real life context.

All lessons have an extensive list of skills and outcomes based on Australian Curriculum content. The lessons include student worksheets and assessment ideas. The assessment tasks include checklists, student self-evaluations, work samples to collect and specific observations to make.

The creativity of the designs made by the students is limited only by their imagination. Take pleasure in watching your students learn while having so much enjoyment, encourage them to explore motion, speed and ratios. Build an understanding through hands-on activities where all efforts are highly valued.

When learning is fun, many lessons can be taught.

A handwritten signature in black ink that reads "Sandra Bishop". The signature is written in a cursive style with a large, sweeping initial 'S'.

Sandra Bishop
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Discover and Explore

Skills/Outcomes

Related Australian Curriculum content descriptions include:

Australian Curriculum: Mathematics

- Establish understanding of the language and processes of counting by naming numbers in sequences, initially to and from 20, moving from any starting point (ACMNA001)
- Subitise small collections of objects (ACMNA003)
- Answer yes/no questions to collect information (ACMSP011)
- Choose simple questions and gather responses (ACMSP262)
- Use direct and indirect comparisons to decide which is longer, heavier or holds more, and explain reasoning in everyday language (ACMMG006)

Australian Curriculum: Science

- Share observations and ideas (ACSIS012)
- Compare observations with those of others (ACSIS213)
- Represent and communicate observations and ideas in a variety of ways such as oral and written language, drawing and role play (ACSIS029)

Australian Curriculum: Design and Technologies

- Explore the characteristics and properties of materials and components that are used to produce designed solutions (ACTDEK004)
- Use materials, components, tools, equipment and techniques to safely make designed solutions (ACTDEP007)

Materials

Put out all of the materials that you have. Contents of kit will vary.

Generally a kit would contain:

- Gears
- Bases (these may vary from kit to kit)
- Shafts/pillar extenders
- Crank handles

Extras may include:

- Square pillars
- Axles
- A motorised gear



Procedure:

1. Give the students all of the materials and ask them to make comparisons between the materials, estimate numbers of materials before them, compare the number of large gears to the number of smaller gears etc. Sort and classify the materials.
2. Give the students time to explore the materials as individuals and then in small groups. Encourage students to use as many or as few pieces as they like. Basically it is desired that the children play and don't feel inhibited at all. Pose the question, "What can you discover about these materials?"
3. After 30 minutes or so, ask the students to share with each other what they have discovered using the gears. Encourage students to question each other about the materials so as to collect information about discoveries.
4. After sharing ideas/discoveries, let the students try each other's ideas and further explore the materials in their group.
5. Encourage talk amongst the students.
6. As a class, write a wall story highlighting the discoveries that the children made. Display this prominently.

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