Revise and draw: Oblique drawing (30 minutes)

Oblique drawing:

Draw the lines for length and height straight up and straight across, exactly like the front view of the box in Figure 21. Oblique drawings should be scale drawings. For the front view of an oblique drawing, use true scale measurements. So if the length of the object is 600 mm and the scale is 1:10, you draw the length as 60 mm. Indicate the scale below your drawing. Corners are projected at a 45° angle and the depth measurement must be half the true scale measurement. So if the depth is 300 mm and the scale is 1:10, you must draw the breadth line to 15 mm.

Make sure that you have given your drawing a heading.

Scale:

We often draw objects smaller than they really are. A scale drawing of 1:4 is four times smaller than the real object. If the object is 400 mm wide, we draw its width as 100 mm.

Make an oblique drawing

Work on your own.

1. Choose one part of your model to draw in oblique view.
2. Draw a rough sketch first.
3. Then use grid paper. Draw the part to scale. You can draw it larger than it is on the model. If you draw it twice the real size, show the scale as 2:1.
**Develop an evaluation sheet** (30 minutes)

Your crane with its electromagnet is finished. Now you have to develop a checklist to judge your crane and how well it meets the specifications.
- Does it meet the criteria you identified as specifications?
- Does the electromagnet work well?

To judge the cranes, you will develop an evaluation sheet. Remember: you developed an evaluation sheet to evaluate your tower last term.

**Develop an evaluation sheet**

1. Work on your own. This task is for assessment. Make a list of the features the crane model must have. Use your list of specifications to help you. [5]

Here is an example:

<table>
<thead>
<tr>
<th>The crane needs to work properly.</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The crane must be able to lift and lower small metal objects.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Work as a team.
   (a) Combine your individual sheets into one joint evaluation sheet.
   (b) Include a three-point scale. 3: Good, 2: Just all right, 1: Poor.

This evaluation sheet will be used to evaluate your own model and the models that the other groups have built.

3. Use the evaluation sheet to evaluate your own model.
Week 5

Evaluate the other models (30 minutes)

When you evaluate work, you have to do your best to be “objective” and fair. This means that you must not give high marks to your friends unless they really deserve it. You have to give them the marks they deserve for the work they have done, and you should be able to explain and support the mark you gave. This means that your comments have to be valid.

Evaluate the models of other groups
1. Work as a team.
2. Copy your evaluation sheet three or four times.
3. Evaluate the models of three or four teams. Remember to write down the names of the teams you are evaluating.

Prepare your presentation (30 minutes)

Each team should prepare an oral presentation of their plans and functioning model to the class.

The team’s presentation should be longer than five minutes but shorter than seven minutes.
1. Plan your presentation.
   • All the members of your group should be part of the presentation.
   • Decide what each person will do.
   • Each person should talk about the work they did and the role they played.
   • One learner should show and explain the design sketch.
   • Another learner should explain the circuit diagram and draw it on the board.
   • One learner should show how the crane with the electromagnet works.
   • Another learner should talk about the problems the group experienced.
   • Include the following information in your presentation:
     o how an electromagnet works,
     o how to make an electromagnet stronger, and
     o why it is important to sort metals.
• Make an artistic drawing of your model crane with its electromagnet.
• Decide who will start and who will talk next. Know when it is your turn.

2. Use the rest of this lesson to practise your presentation. You might also need to spend some time at home for this. You have lots of time to practise as you will be doing self-reflection in the next lesson.

**Reflection and evaluation**

(30 minutes)

To **reflect** means to look back. Looking back at what you did and how you completed a task is an important learning activity. It gives you the opportunity to identify the mistakes you made, as well as what you did well. From this, you learn not to make the same mistakes again, and how to improve on what you do well.

**Reflect and evaluate your own work and contribution**

Work on your own. This task is for assessment.

1. Write down at least five activities that you want to reflect on. Choose at least:
   - one practical activity,
   - one drawing activity,
   - one activity where you had to answer questions, and
   - one group activity.

2. Draw up a table like the one below. Tick a face to show how you felt about each activity.

<table>
<thead>
<tr>
<th>Description of the activity</th>
<th>😞</th>
<th>😕</th>
<th>😊</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>
Deliver your presentations

It is important that everyone takes part, as you will all be assessed by your teacher. You will have three lessons (150 minutes) to complete the presentations.

Oral presentation
1. Each person’s oral presentation will be assessed separately.
2. Your teacher will use an evaluation sheet like the one below to assess you.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Good</th>
<th>Satisfactory</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>The learner speaks clearly so that everyone can hear.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The learner speaks confidently, knows the work and what he or she wants to say.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The learner makes eye contact with learners sitting in the front and in the back of the class.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The learner explains his or her own role in the project.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The learner shows and demonstrates the model/drawing/diagram.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Week 6
Presentations continued

All the presentations must be finished by the end of this week.
In this chapter, you will learn about emergency situations and the effects they have on people. People are sometimes forced to leave their homes because of emergencies. They then become refugees. You will learn how sheltered, safe areas are created for refugees and how aid workers provide food and water.

17.1 Situations that cause people to become refugees .......................................................... 206
17.2 Initial problems facing refugees ..................................................................................... 209
17.3 Refugees in a foreign land ............................................................................................ 210

Figure 1: This family of refugees were forced to leave their home and now need a safe place to live until they can return.
Figure 2: Devastating fires are just one form of emergency situation that communities might have to face.
CHAPTER 17: EMERGENCY SITUATIONS

17.1 Situations that cause people to become refugees
Emergency situations can cause large numbers of people to be forced from their homes. Emergencies not only affect people in areas where a disaster took place, but also the people in the area where the refugees are moved to. People need shelter, water and food. A refugee camp has to be set up, and the camp needs to be very well planned.

In emergencies, plans to help refugees need to be made very quickly to prevent further suffering. Two types of emergency situations that force people to leave their homes are war and natural disasters.

In this lesson, you will learn about emergency situations and investigate ways to help refugees.

**War**

Since the beginning of time, there have been wars between people all over the world, and while armies fight battles, people are forced to flee from their towns and villages. Over the centuries, many people have ended up as refugees. Even today, there are more than 3,8 million refugees all over Africa. These people have been chased from their homes because of wars.

*Figure 3: This refugee camp was set up for Rwandans during the war in their country in 1994.*
Natural disasters

Natural disasters are caused by nature and not by people. Floods, wildfires, earthquakes, and volcanic eruptions are all natural disasters. All of them can force people to leave their homes.

Natural disasters usually happen with no warning. They can create emergencies very quickly, which means that people have to move to safer areas immediately.

In 2000, a terrible flood hit Mozambique and destroyed huge areas of farming land. Thousands of people lost their farms and were forced to flee to dry ground. Refugee camps were set up in other parts of Mozambique and also in South Africa.

Compare the pictures on the right. These pictures were taken from a satellite in space. They show the same area in Mozambique before and during the flood, and how much land was flooded.

Figure 4: This satellite picture of the disaster area in Mozambique was taken before the flood.

Figure 5: This satellite picture of the disaster area in Mozambique was taken during the flood.
A natural disaster can also happen over a longer period of time. In Africa, we rely on rain to water our crops, but this continent often has droughts. Droughts can create emergencies for farmers. During long droughts, large groups of people can be forced to leave their homes and their farms. These people then look for food, water and shelter, and they become refugees.

Figure 6: Droughts in Africa cause the destruction of habitats and the death of wildlife.
17.2 Initial problems facing refugees

Disasters such as floods and wars happen suddenly, which means that people have to leave their homes quickly. These refugees will not have a lot of food and water with them. They will also not have tools or materials to build shelters.

Emergencies that happen more slowly over longer periods of time include droughts, or long wars. Refugees in situations like these have a bit more time to pack up their possessions and plan their journey.

The type of emergency situation influences the mix of people in a refugee camp. Sometimes, there will be more men than women. Other times, there will be many babies who are not able to walk yet and small children. And at other times, there will be many elderly people who need special help and care.

For example, during a war, there are usually fewer men at home, because the men will be fighting. During a drought, babies and elderly people may die since they are more vulnerable.

Different people have different needs for food, water and shelter. Children become dehydrated more quickly than adults do and they also need more high-energy foods. Old people need more warmth and blankets.

Questions for you to answer

1. Which emergencies happen suddenly, without warning?
2. How will these sudden emergencies affect each of the following:
   (a) the mix of people in the group?
   (b) the amount of food and water refugees have with them?
   (c) the ability of refugees to build their own shelters?
3. Which emergencies happen slowly, over a longer period of time?
4. How will these slower emergencies affect:
   (a) the mix of refugees in the group?
   (b) how much food and water will they have with them?
   (c) whether they can build their own shelters or not?
5. Which emergencies are the most difficult to plan for? Explain why you say so.
6. Which emergencies are easier to plan for? Explain why you say so.
17.3 Refugees in a foreign land

When refugees arrive at a refugee camp, they need many things, such as food, clean water and shelter. These basic needs have to be supplied by the rescue workers who are setting up the refugee camp.

In the following exercise, you will look at the experiences of people on either side of a refugee situation: refugees and the rescue and aid workers who are helping them.

**Situation: Refugees in a foreign land**

Discuss the situation below in groups of three or four before answering the questions yourself. Your answers should be short paragraphs.

A sudden war has broken out between two small countries in central Africa and a large number of people had to flee to a neighbouring country. Imagine what it must be like to be one of the refugees, and also what the situation would be like for the host nation.

1. What do you think the mix of people in the group is like? Remember this is a war situation, and people had to flee from their country. Think about the ages of the refugees and write down which groups will need the most care and attention.

2. What are their needs for shelter? Remember that they have not brought many possessions with them. Who will provide the shelters or the materials needed to build them?

3. What food and supplies do the refugees need? Remember that the refugees have been travelling on foot for long periods of time. Think about the ages of the people. Will some of them need more food and water than others, and if so, why? Will some people have special needs, and if so, why?

**Next week**

One of the biggest problems facing refugee camps is to provide enough nutritious food. Nutritious food provides all the nutrients your body needs to stay healthy.

Think about these questions to prepare for next week’s lesson:

- Which foods are the easiest to find in your area?
- Which foods are the cheapest to buy in your area?
- Which foods would you choose to feed a large camp of refugees?
Chapter 18
Processing food for emergency situations

In the previous chapter, you learnt about refugees and why large numbers of people can be forced to leave their homes and their countries. Usually, refugees have little or no possessions. They can also not carry enough food for a long period of time. In this chapter, you will learn how to process food for emergency situations. Processed foods last much longer than fresh foods and are ideal for refugee camps. You will write a design brief and plan an emergency meal that is nutritious and tasty. It should be possible to make this emergency meal in a refugee camp.

18.1 Investigate types of food ................................................................. 214
18.2 Investigate your refugee camp .......................................................... 218
18.3 Write a design brief to feed your refugee camp ................................. 219

Figure 1: A refugee camp in Darfur, Sudan, in North Africa
Figure 3
18.1 Investigate types of food

When refugees travel to a host country, the people in the host country usually take care of them.

In the previous chapter, you looked at the mix of people and how this mix would change, depending on whether the emergency was caused by a natural disaster or a war.

The type of food refugees eat depends on the mix of the group. Children need more protein than older people, babies need special milk formulas, and old people need lots of vegetables to protect them from disease.

For homework, you had to think about types of food that are available in South Africa and that can feed a large group of people. The food had to be cheap, easy to find and nutritious.

Refugees do not expect expensive food, just enough healthy food. Poor nutrition can lead to problems like illness and disease. If refugees get weak or sick, they will not be able to look after themselves and the situation in the refugee camp will become worse.

Nutritious food

To remain healthy, the human body needs different types of food, from all the food groups. Diets that contain food from all the food groups are called balanced diets.

A balanced meal includes the following food groups:

- Carbohydrates: These provide energy and are found in starchy foods like potatoes, mealie meal, rice and bread.
- Protein: These build muscle and give us strength. Protein-rich foods include meat, fish, chicken, eggs, beans, cheese and milk.
- Fats and oils: These provide energy and help to protect our internal organs. They also help our bodies to fight disease. Foods in this food group include cheese, butter, margarine and oils such as sunflower or canola oil.
- Vitamins and minerals: These are found in all foods, but especially in fresh fruit and vegetables. They are very important for good health, strong bones and teeth, and to keep your brain working well. Vitamins also help to prevent disease. For example, Vitamin C, which is found in oranges and lemons, fights colds and flu.
Food groups and balanced diets

Have a look at the drawing below and see if you can tell which of the foods are high in carbohydrates, protein, fats and oils, and vitamins and minerals. Notice that similar types of foods are grouped together into so-called food groups. We need to eat food from all five food groups to stay healthy.

You can think of nutrition as a wheel where each type of food is an important part.

Figure 4: A balanced diet consists of food from all five food groups every day.
Also remember that your body needs fresh, clean water to keep working and to digest and absorb the food you eat.

Figure 5: Drinking fresh, clean water is very important for your health.

**Compare notes and make decisions**

For your homework in the previous chapter, you were asked to think about foods that are cheap and easy to find, and that are nutritious and easy to prepare.

- Work in pairs and compare your homework notes.
- Explain the reasons for your choices to each other. The main things to consider are the cost of the food, how easy it is to find, and how nutritious it is.
- Make a joint decision on what you would feed the refugees. If both of you have good ideas, you can suggest a combination of your dishes.

Figure 6: Bananas are very nutritious and they are cheap and plentiful in summer.
Figure 7: Oranges have lots of Vitamin C to help prevent colds and flu. They are cheap and widely available in winter.

Figure 8: Wheat is very nutritious. It contains carbohydrates for energy.

Figure 9: Spinach grows quickly and is high in vitamins and minerals.
Questions about your investigation

1. What type of food did you choose? Write down why you chose it.
2. Did you think about the different age groups of the people in the camp? If you have chosen different foods for different age groups, explain why you did that.
3. Is there a lot of this food available to feed a large group? Write down why it should be easy to get enough of it for the camp.
4. Is the food nutritious? Write down why you think the food you have chosen will keep the refugees healthy.
5. Is it easy to prepare? Write down the reasons for your answer.

18.2 Investigate your refugee camp

Whole class work: Make decisions

A group of 100 refugees have settled near your community. You have been asked to feed them. Before you draw up your plans, the whole class has to make decisions about the issues below.

• What is the mix of the group? Divide them into four categories: babies, children, adults and old people. Copy and complete the table below to help you with the next task.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Number of people in this age group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Babies (1–5 years old)</td>
<td></td>
</tr>
<tr>
<td>Children (6–15 years old)</td>
<td></td>
</tr>
<tr>
<td>Adults (15–65 years old)</td>
<td></td>
</tr>
<tr>
<td>Old people (older than 65 years)</td>
<td></td>
</tr>
</tbody>
</table>

• Your group has not brought any food with them. Decide where you will find food to feed the people. How will you transport the food? How will you cook it?
• Is there a supply of clean water nearby? Why is water important for cleaning and cooking food? Discuss your answers with each other.
• Will the food be nutritious? Can you feed the people the same food every day until they can be resettled? Discuss your answers with each other.

Write notes on all your decisions.
18.3 Write a design brief to feed your refugee camp

**Listing the ingredients and quantities per meal per person**

Before you can work out how much food you need for 100 people, work out how much food you need for one meal. The food needs to be nutritious, tasty and easy to find. It should include as many of the food groups as possible.

For each age group, list the ingredients and amounts you will need for one person. Draw up tables like the ones below. One example has been done for you.

**Amount of each ingredient needed to feed one baby**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samp</td>
<td>One third of a cup (100 grams)</td>
</tr>
</tbody>
</table>

**Amount of each ingredient needed to feed one child**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samp</td>
<td>Two thirds of a cup (200 grams)</td>
</tr>
</tbody>
</table>

**Amount of each ingredient needed to feed one adult**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samp</td>
<td>1 cup (300 grams)</td>
</tr>
</tbody>
</table>

**Amount of each ingredient needed to feed one old person**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samp</td>
<td>Half a cup (150 grams)</td>
</tr>
</tbody>
</table>
Design a meal for 100 refugees

Once you have completed the ingredient tables, each of you have to write a design brief to feed the 100 refugees. Your design brief should list your specifications. Specifications are the ingredients that you will need to make the meal.

You need to work out how much of each ingredient you need to make one nutritious meal for each age group. For example, this is how you would do the calculations.

For each ingredient, add the amount needed for each of the age groups:

- One baby needs 100 grams of samp for one meal. Now multiply 100 grams by the number of babies in your group.
- One child needs 200 grams of samp for one meal. Now multiply 200 grams by the number of children in your group.
- One adult needs 300 grams of samp for one meal. Now multiply 300 grams by the number of adults in your group.
- One old person needs 150 grams of samp for one meal. Now multiply 150 grams by the number of old people in your group.

Example:

- If there are 20 babies in your group, multiply 100 grams by 20. This gives you 2 000 grams, or 2 kilograms, of samp needed for all the babies for one meal.
- If there are 30 children in your group, multiply 200 grams by 30. This gives you 6 000 grams, or 6 kilograms, of samp needed for all the children for one meal.
- If there are 40 adults in your group, multiply 300 grams by 40. This gives you 12 000 grams, or 12 kilograms, of samp needed for all the adults for one meal.
- If there are 10 old people in your group, multiply 150 grams by 10. This gives you 1 500 grams, or 1,5 kilograms, of samp needed for all the elderly people for one meal.

Specifications for your design brief

Now write the specifications for your design brief. Make two lists. In the first list, write all the ingredients that you need to make one nutritious meal for 100 refugees of different ages. In the second list, write the amounts of each ingredient you need.

Next week

Next week, you will prepare a meal according to your design brief. It will have to be tasty, nutritious, easy to find and easy to make in the refugee camp. You will taste and evaluate the meal yourselves, so think carefully about what you are going to prepare!
Chapter 19
Making and evaluating emergency meals

In the previous chapter, you investigated the types and amount of food refugees need to stay healthy while they are in an emergency situation. You learnt about nutrition and about the food groups that should be in every meal. You also wrote a design brief to feed a refugee camp of 100 people. In this chapter, you will investigate how to make your own meal, prepare the meal and then evaluate it.

19.1 Method for preparing part of a meal .............................................................................. 224
19.2 Prepare the food .......................................................................................................... 226
19.3 Evaluate the food ....................................................................................................... 227

Figure 1
Figure 2: Ingredients for an easy-to-cook, healthy meal.
19.1 Method for preparing part of a meal

Choose one item of food from your emergency meal. Remember that it should be:
- nutritious,
- easy to find,
- easy to cook, and
- tasty.

Before you prepare the food, write down the steps you have to follow to make it. Write the steps in the correct order, from start to finish. Think carefully about what you need to do first, and then what you need to do after that. To list your steps in this way can be called writing your steps in sequence. Write the steps one underneath the other in a table.

But first, write down how or why you will do each step. How you will do a step is called an instruction. Why you will do a step is called a reason. Write the instruction and reason for each step next to the particular step. Look at the drawing below to see what Linda has done.

![Figure 3](image)

*Figure 3: Draw up a table that shows what you need to do to prepare the food from start to finish. Write the instruction and reason for each step in the column next to each step.*

You have to plan carefully, and then set out your plan using the following guidelines:
- Say whether the food you will cook is for breakfast, lunch or dinner. Explain why you decided to cook it for that meal. Here is an example of how to write your answer in the table:
Example

| Breakfast          | It is the most important meal of the day and will give the refugees a lot of the energy they need. |

- Which item of food did you choose? Explain why. Does it mainly consist of carbohydrates or protein? Look back at the food groups you learnt about in Chapter 18.

Example

| Samp               | It is high in carbohydrates for lots of energy. |

- Estimate how much of each ingredient you will need to make your item of food for one adult. To do this, look back at your design brief in Chapter 18.

Example

| Samp       | 300 grams |

- Write down how you are going to prepare your item of food. Write down each step in the process.

Example

| Measure | Measure out 300 grams of samp. Measure out 1 litre of water. |

- How are you going to cook the food? For this activity, you have to write down the process that you will follow at home, not what you would do at a refugee camp.

Example

| Choose a pot | Select a pot that will be suitable for cooking the food. |
| Mix the ingredients | Place samp, water and salt in the pot. |

- How long do you think the preparation and cooking will take? Divide it into steps. Add up all the steps and put in the total time at the end.

Example

| Measure ingredients | 5 minutes |
| Mix ingredients     | 2 minutes |
| Cook ingredients    | 30 minutes |
| Total time          | 37 minutes |

- Ask an adult at home to help you. Write down in your plan who this person will be.
When you have completed your plan, take it to school. Discuss your plan with another learner. This is an important part of the planning before you cook the meal. If either of you missed an important step, you will have to rewrite your plan. Remember, the steps in your plan are your guide to cooking the food.

### 19.2 Prepare the food

In this lesson, you will follow your plan and prepare an item of food at home. It will only be enough for one person, not for 100 people! You will then bring your food to school and the class will evaluate it.

You need to do this part of the activity at home.

- Find all the ingredients before you start.
- Read the plan you wrote to help you. Follow the steps closely.
- If you change one of the steps, write down how you changed it. Also write down why you changed it. You will use this information when you evaluate your making sequence.

After cooking the meal, taste it to check that it tastes good. This is called evaluating the flavour of the meal. If you have cooked the meal for the right length of time, it should be easy to chew and swallow. This is called evaluating the texture of the meal. You will present the meal for evaluation, so it should taste good and be healthy. A healthy meal will have the correct nutritional value. You learnt about nutrition in Chapter 18.
Store the meal in a plastic container with a seal that will keep the air out. If you don’t have a special container, use an empty, clean margarine container. Keep the container in the fridge overnight. Bring your item of food to school the next day for evaluation.

### 19.3 Evaluate the food

Bring your prepared meal to school for evaluation. Work in groups of four. Use plastic spoons and taste each other’s meals.

After trying out all the food that the other learners have brought to school, write an evaluation of their food and of your own food.

---

**Safety warning**

If you use an open fire to cook on, remember that open fires can be dangerous. Always make sure safety measures are in place.

1. Make sure the fire is completely out when you have finished your cooking.
2. Put something around the fire to ensure it does not spread.
3. Keep small children away from the fire.

**Hygiene warning**

Bring your own spoon to school. If you share a spoon, wash it with soap and water before you use it.
Copy and use the checklist below. Tick “yes” or “no” for each question.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flavour: Is the food tasty?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texture: Does the food taste as if it is properly cooked?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutritional value: Is the food healthy?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When you have all tasted each other’s meals and listed your comments, give each other feedback. Do not be rude about other learners’ food. Make positive suggestions. Say how you think they can improve the taste, texture or nutritional value of their food.

Now write an evaluation of your own meal based on the feedback you received. Write your evaluation in paragraph form.

**For example:**

I found this to be a very interesting task. At first, it was difficult to work out how to make sure there was enough protein and carbohydrates, so I used the food groups to guide me. I chose samp as it is a very nutritious grain, which is cheap and easy to find. I checked on cooking times for the samp to make sure it was properly cooked and that the texture was right. I added salt and butter to make it tasty.

Now write a second paragraph about everything that you learnt in this chapter. At the end, write down how you would do it differently next time.

**For example:**

In this chapter, I learnt about planning. I also learnt how to prepare and cook an item of food. If I had to do this lesson again, I would add spinach to my samp, because spinach has vitamins that are not found in samp. Spinach would have made my food more nutritious.

**Next week**

In the next lesson, you will investigate materials that can be used in rescue operations. Choose two emergency services that support the community, for example the fire department and the National Sea Rescue Institute.
In the previous three chapters, you investigated situations that can cause people to become refugees. You also investigated how food is processed. You then wrote a design brief for a meal for 100 refugees, and you designed, made and evaluated food that is nutritious as well as tasty. In this chapter, you will investigate the special clothing worn by people who work in emergency situations. For example, these rescue workers could be from the fire department or the National Sea Rescue Institute (NSRI).

20.1 Emergency services ................................................................. 232
20.2 Clothing for emergency workers .................................................. 233
20.3 Investigate protective clothing and emergency equipment .............. 234

Figure 1: Fire fighters have to wear special clothes to protect them from fires.
Figure 2: Sea rescue workers also wear specifically designed protective clothing.
20.1 Emergency services

Dangerous situations such as fires, floods and accidents usually happen unexpectedly. People need to take immediate action to save the lives of the people involved. This type of situation is called an emergency.

Emergencies don’t always mean that many people are forced away from their homes. An emergency may affect only one family, or even just one person.

For example, a house fire or a wildfire can threaten a group of houses. Other examples of emergencies are when swimmers get into difficulty out at sea, or when fishermen are in trouble on a sinking boat.

People who work in emergency services are called emergency workers. They are specially trained to respond to emergencies and they must be ready to respond quickly to a call for help. Emergency services include the fire department, police, ambulances and sea-rescue services.

Emergency workers go into dangerous situations, so they need to wear protective clothing.

Emergency workers wear clothes that are designed to protect them from danger. These clothes are known as personal protective equipment, or PPE. Experts study the dangers caused by emergencies and design and make clothes, shoes, helmets and other items that will protect emergency workers during these situations.

**Emergency services**

1. Think about emergency situations that can happen in your community. Draw up a table with two columns, and list the emergency situations in the first column. List as many as you can think of.
2. List the emergency services that can be called to help in each situation. Write them in the second column of your table.
3. Think about other communities. Are there emergencies that could affect them, but not affect your community? Think about the environment where these communities live. Are there rivers or beaches nearby? Are they in cities, the country, forests or grass fields? List all the emergencies that could happen in these places. Then list the emergency services that can be called in to help them.
20.2 Clothing for emergency workers

Emergency personnel wear protective clothing that is specially designed to protect them from the dangers they could face in an emergency. For example, fire fighters need protection from flames and heat, and sea-rescue workers need protection from water, rain, the wind and cold.

The materials we use to make any kind of clothing are called “textiles”. Special textiles are used to make protective clothing. These textiles are made from woven or knitted materials, that can have chemicals added to them to give them special qualities, such as waterproofing or fire resistance.

![Figure 3: A fire on a mountain. Fire fighters monitor the situation to make sure that the nearby community is safe.](image)

A firefighter’s protective clothing

- Firefighters’ jackets are made from fire-resistant textiles, and are lined with reflective tape so that fire fighters can be seen in the smoke.
- Firefighters’ boots are made of strong leather, with thick soles to protect their feet from flames.

A sea rescuer’s protective clothing

- Sea rescuers’ jackets are designed to keep sea rescuers dry and warm, even in heavy storms. They are made of thick plastic or rubber.
- Waterproof boots, or wellingtons, are made of thick rubber. They keep a sea rescuer’s legs and feet dry and warm. The rubber sole also prevents slipping on wet decks.
Clothing for emergency workers

Now that you have learnt about some of the protective clothes used by emergency workers, you can design some protective clothes of your own.

Fire fighters and sea rescuers wear the specific clothes mentioned on the previous few pages. Think about the other emergency services that you listed in the exercise “Emergency services”.

1. Write down at least three emergency situations that they may be called to deal with.
2. Write a list of special protective clothes you think they should wear in each situation.
3. Write down the textiles their clothes should be made of.
4. Draw a picture of one type of protective clothing that you have written about.

20.3 Investigate protective clothing and emergency equipment

In this section, you will investigate the kinds of protective clothing and emergency equipment used by fire fighters and sea rescuers.

Group investigation

Work together in groups of four.

Choose one of the emergency professions you have learnt about: fire fighting or sea rescue.

Discuss the special clothes that these emergency workers wear to help protect them in their duties. Use the information in this chapter, but also try to find extra information from people you know. For example, maybe you know someone who works at the fire department and can talk to them. The pictures on the opposite page will give you more information.

Wellington boots were named after a Duke of Wellington in England. He was a famous soldier who wore them into battle.
Protective equipment or emergency equipment used by emergency workers includes life jackets for sea rescuers and oxygen tanks for firefighters.

Sea rescuers always wear life jackets when they are at sea. Life jackets help them to float if they fall into the sea, so that they do not drown. A life jacket is made from thick plastic or rubber and has air or foam inside so that it can float.

Figure 5

Fire fighters carry oxygen with them to help them breathe when there is a lot of smoke from a fire. An oxygen tank is an example of the type of protective equipment used by emergency workers. The tank is made of thick metal to keep the oxygen from exploding. The pipes are made from rubber so that they are airtight (oxygen cannot leak out). The dials have a covering made of glass or see-through plastic.

Figure 6
Protective clothing and emergency equipment

After you have done your investigation and you have all the information, copy and complete a table like the one below.

In the first column, write down an item of clothing or equipment that you have learnt about. Then answer the questions in the other columns. You should say what the item of clothing or equipment is made from, and also say why it is made from that material. Here are two examples to get you started.

<table>
<thead>
<tr>
<th>Firefighters</th>
<th>Sea-rescue workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Made from</td>
<td>Why?</td>
</tr>
<tr>
<td>jacket</td>
<td>fire-resistant textile</td>
</tr>
<tr>
<td>boots</td>
<td>leather</td>
</tr>
</tbody>
</table>

After you have completed the table, answer the following questions on your own:

1. Why is it important that protective textiles are used to make clothes for emergency workers?
2. What clothes should fire fighters wear, and what equipment should they carry when they respond to a call?
3. In what other emergency situations should special clothing or equipment be used? Think about the refugees you learnt about in Chapter 17. What kind of emergencies could happen in their camp?

Next week

Next week, you will begin your mini-PAT for this term. In this mini-PAT, you will investigate a natural disaster and design emergency shelters for victims of the disaster. You will also sketch a design idea and make a model of an emergency shelter.
Chapter 21 MINI-PAT
Shelters for refugees

For the next three weeks, you will investigate building techniques (past and present), making fabric waterproof and the burning characteristics of textiles. Then you will design and build a model emergency shelter. You will work on your own and your teacher will assess your work.

Week 1
Investigate materials and building techniques used by indigenous people for constructing housing, as well as the materials and techniques used in informal settlements .................. 240

Week 2
Investigate chemicals that can waterproof textiles and chemicals that can make textiles fire resistant. Find out about the burning characteristics of various textiles ....................... 248

Week 3
Design and make an emergency shelter for people who have become homeless ............... 253

Assessment
Design:
Design brief and specifications ....................................................................................... [12]
Design sketch ............................................................................................................... [20]

Make:
Waterproof fabric .......................................................................................................... [10]
Model emergency shelter ............................................................................................... [28]

[Total: 70]
Shack dwellers face many problems. Fires are particularly dangerous. Shack fires kill many people every year. People in shacks use open fires and candles for heat and light. When a candle falls over or an open fire is not dampened down to kill all the flames, a fire starts. These fires spread very quickly because shacks are built too close to each other. There are also no proper roads in between the shacks. This makes it difficult for fire fighters to reach the fires in order to put the fires out.
People sometimes build houses on an open piece of land without thinking if it is a good place to live. Sometimes the land is low lying and there is nowhere for the storm water to go when it rains heavily. The area becomes flooded and the water runs through their homes. This causes a lot of damage to the few possessions they have. Often people don't want to leave their flooded shacks because they are scared that their possessions will be stolen while they are living in temporary housing.
Week 1

Investigate Part 1: Let us look how our ancestors lived
(30 minutes)

The Khoi (Khoikhoi or KhoeKhoe), which means “people people”, and the San (Bushmen or Sho), which means “men without domestic livestock”, were the first people to live in southern Africa. They were the earliest inhabitants of our country and have been living here for thousands of years.

Both groups were nomadic. Nomads do not live in one place for a long time. They move from a place in search of food for themselves and their animals. The Khoi people owned livestock. They moved in search of good grazing for their cattle and goats. The San people were hunter-gatherers. They did not have livestock. The men tracked and hunted wild animals. The women collected mainly eggs, roots and bulbs.

Both groups built dome-shaped huts made from green sticks tied together at the top. These frame structures were covered with reeds and grasses that grew around them. Some of the Khoi wove grass into mats, which they used to cover the frames. The grasses or reeds made the huts windproof and waterproof. When they moved on they left the huts behind, so their huts were not made to last a long time. These were not permanent dwellings.
Look at the homes of the Khoi and the San people

Work in pairs.
1. What materials did the Khoi and the San use to build their homes?
2. Where did they find the materials they used?
3. Were the building materials suitable for the environment where the Khoi and San lived? Explain your answer.
4. What happened to the huts and materials they left behind once they moved on to another place?
5. Do you think that any of the materials would have harmed the surrounding environment where they were used? Give a reason for your answer.
6. Why did the Khoi and the San people need their structures to be temporary?

Investigate Part 2: Permanent homes of our indigenous people (30 minutes)

About 2 000 years ago, people slowly migrated from northern Africa to the south. Four main groups ended up in the area that is now South Africa: Nguni, Sotho, Venda and Tsonga. These are the forefathers of most of our indigenous cultures. They grew crops, mainly grains like maize for food. They kept cattle for meat and milk. So they needed to live close to rivers or streams and in areas where the land was fertile.

Because they lived in one place, they built permanent homes.

Some people built dome-shaped huts. They did this by:
• making a framework with upright branches,
• using thin green saplings to make a fine mesh between the upright branches, which makes a strong framework that lasts for a long time, and
• covering the framework with thatch and then with plaited grass mats. The two layers of covering insulate the huts against extreme temperatures and keep the people warm and dry.

Migrate: to permanently move from one place in a country to another place or another country.
Indigenous: people originating in a particular country.
Other people built round “rondavel” homes.

- Saplings were used for the straight upright walls.
- Gaps between the saplings were filled with clay.
- The walls were plastered on the inside and outside with clay.
- A cone-shaped roof was made from a framework of wooden sticks covered with grass, reeds or thatch.
Ndebele people came into contact with immigrants from Europe. They started to build rectangular homes.

- The walls were built with mud bricks and plastered with mud.
- The outside walls were decorated with brightly coloured designs. This makes these homes “distinctive” and attractive.

**Immigrant:** a person who moves to another country permanently.

Something is “distinctive” if it has a special property or quality that makes it stand out from other similar things.

*Figure 8: Rectangular Ndebele hut*

*Figure 9: Corbelled hut*
Matjiehuts were temporary houses built by the Nama people of the Richtersveld. This building style was later adopted by white farming families when they needed temporary houses.

Corbelled huts were built by the first colonial farmers that ventured inland to the Northern Cape. They were nomadic farmers, called trekboers. This is an area where no trees grow so they used rocks for their first simple homes. Flat stones were used to build the dwellings, from the walls right up to the roof, with a minimum of a mud-clay bonding substance. The ‘scaffolding’ was there so you could easily climb up and make running repairs to the roof. Although this style of building originated in the Mediterranean more than 4 000 years ago, it was only introduced to South Africa once settlers arrived from Europe and Indonesia a mere 300+ years ago.

**Look at the huts built by our indigenous people**

1. Why did these people build permanent homes?
2. What makes their dome-shaped huts better than those that the Khoi and the San people built?
3. Why do the people that build ‘rondavel’ huts choose to use mud as a building material?
4. What is the advantage of using thatch as a building material?
5. What is special about the homes of the Ndebele people?
6. Are the materials used to build these homes suitable for building homes? Explain your answer.
7. Would any of the building materials they use harm the environment? Explain your answer.

8. Do you think the early people who moved from North Africa were immigrants like the people from Europe that came much later? Explain your answer.

**Investigate Part 3: Dwellings in informal settlements**

(30 × 2 = 60 minutes)

Many people migrate from rural areas to large towns and cities looking for a better life. They arrive with no money and no place to live. They build temporary places to live on open pieces of land near the towns. As more people arrive, more houses are built until there is a whole group of houses close to each other. We call this group of houses an informal settlement.

These informal settlements have no roads, no water supply, no toilet facilities and no waste removal. These temporary houses are commonly called shacks.

People use materials that they find in scrap yards and what they can afford to buy. Some examples are cardboard, plastic sheeting, wooden planks, old tyres, pieces of polystyrene foam and sheets of corrugated iron.

These materials have many disadvantages:
- Polystyrene foam and cardboard catch fire and burn easily.
- Dry wood burns quickly too.
- When tyres get old and deteriorate, they give off unhealthy fumes.
- Plastic and tyres give off black fumes when they burn. It is very unhealthy to breathe in these fumes.
- Old sheets of material made of asbestos are sometimes taken from demolished buildings and used to make walls and ceilings. Asbestos is very harmful to humans and should be avoided as a building material.

**WARNING**

Asbestos is very harmful to people. The fine fibres irritate the lungs and can cause lung disease and cancer. Its only advantage is that it is heat and fire resistant, but this does not make up for its health hazard.
Look at the materials used to build shacks

1. Look at the photographs of shacks and informal settlements on the previous page. Draw up a table like the one below to record information about the different materials. Do not use the example that has been completed for you.

<table>
<thead>
<tr>
<th>Material</th>
<th>What is the material used for?</th>
<th>Is it suitable for what it is being used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bricks</td>
<td>To hold down a roof</td>
<td>Bricks are not heavy enough to hold down a roof during a strong wind.</td>
</tr>
</tbody>
</table>

2. Do you think the materials used by the Khoi and San people and the indigenous people are better or worse than those used to build shacks? Give reasons for your answer.
Week 2
Let us help the disaster management team (30 minutes)

The scenario
The disaster management team wants to be better prepared for emergency situations. They need emergency shelters that can be moved easily to disaster areas. The shelters will be stored until there is a need for them. They must be set up and packed away quickly and easily.
The health of the disaster victims who will be housed in the shelters is important. The shelters have to be sturdy and windproof and waterproof. They must be safe and large enough for six people to live in for up to a month.

They have asked for help with a design. The specifications are:
- design a shelter,
- build a model of the design,
- the structure must be covered with fabric that you have made waterproof, and
- the shelter should keep people safe and healthy.

The first task is to find out how to make fabric waterproof. The second task will be to find ways of making fabric fireproof. Your teacher did some research and found the following information.

Different ways to make fabric waterproof
- Spray fabric with a commercial silicone spray.
- Rub candle wax or petroleum jelly (Vaseline) on the fabric.
- Paint fabric with any PVA paint.
- Cover fabric with transparent plastic contact sheeting. This plastic sheeting has a smooth front and a sticky back. You can also call it sticky-backed plastic.
- Mix ½ cup cooking oil and ¼ cup turpentine in a spray bottle. Spray the fabric a few times with the mixture.

Different ways to make fabric less likely to catch fire and burn
- Mix 2 tablespoons borax with 1 cup hot water in a spray bottle. Spray fabric a few times until soaked. Leave to dry and spray again.
- Mix 2 tablespoons borax and 1 tablespoon boric acid with 1 cup hot water in a spray bottle. Spray the fabric, leave to dry and spray again. Repeat a few times.
- Paint fabric with PVA paint and cover the fabric with sand on both sides while the paint is still wet.

Something that you add to make fabric or something else difficult to burn is called a “fire retardant”.

Get ready to conduct water and fire retardant experiments in your next lesson

1. You will work in groups. Some groups will conduct the waterproof experiments and other groups the fire retardant experiments. Work in groups of six. Each group will split up into three pairs. Get your groups and pairs together.

2. Use identical pieces of cotton fabric for all the experiments. Scrap pieces of canvas or denim will be ideal. Each pair will need a piece of fabric more or less 10 cm × 10 cm.

3. You will need lots of old newspapers or magazines to work on.

To compare the different ways of treating fabric in a fair way, you need to use the same type of materials for each treatment.

---

**Figure 12: Some materials for waterproofing tests**

**Figure 13: Some materials for fire retardant tests**
Waterproofing and fireproofing (30 minutes)

In this lesson, you will prepare the samples for testing later.

Groups that will waterproof fabric:
- Pair A: You will need three pieces of fabric. Apply candle wax to the first piece, petroleum jelly to the second piece, and PVA paint to the third piece.
- Pair B: Apply sticky-backed plastic to a piece of fabric.
- Pair C: Apply cooking oil and turpentine to a piece of fabric.

Leave the samples to dry on newspaper. Write the method you applied on your sample on the newspaper. That way you will know which method was applied to each piece of fabric.

Groups that will make fabric fire retardant:
- Pair D: Apply borax solution to a piece of fabric.
- Pair E: Apply borax and boric acid solution to a piece of fabric.
- Pair F: Apply PVA paint and sand to a piece of fabric.

Leave the samples to dry on newspaper. Write the method you applied on your sample on the newspaper. That way you will know which method was applied to each piece of fabric.

Investigate Part 4

In this lesson, you will test your samples to find out how well the different methods worked. Use one piece of fabric that was not treated by any method to help compare the effectiveness of the treatments. We call this the control sample.

Appoint one pair to do the testing. The other group members have to record what they observe.

Testing samples (30 minutes)

Test waterproofed samples

Use a spray bottle filled with water. Spray the samples until they are wet on top. Lift up the sample and observe the newspaper underneath. What do you see?

Draw up an observation table like this one:

<table>
<thead>
<tr>
<th>Method applied</th>
<th>Paper stays dry</th>
<th>Paper slightly wet</th>
<th>Paper very wet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control sample (untreated fabric)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candle wax</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petroleum jelly</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Method applied | Paper stays dry | Paper slightly wet | Paper very wet
---|---|---|---
PVA paint | | | |
Sticky-backed plastic | | | |
Cooking oil and turpentine | | | |

Copy and complete:
1. The most effective method is:
2. The least effective method is:

**Test fire retardant samples**
You cannot set alight the whole sample. That would be too dangerous. Cut a thin strip from each sample. The strip of fabric must be less than 1 cm wide.

**You will need:**
- a metal sheet, enamel plate or piece of wood to work on. Do not work on newspaper, since paper burns easily.
- a candle and matches.
- a pair of tongs or a wooden clothes peg to hold the sample over the flame.

Hold the sample over the flame for a few seconds. Observe how it reacts while in the flame and once removed from the flame. Copy and complete the table below.

| Method applied | Reaction while in the flame | Reaction once removed from the flame |
---|---|---|
Control sample (untreated fabric) | | |
Borax solution | | |
Borax and boric acid solution | | |
PVA paint and sand | | |

Copy and complete:
1. The most effective method is:
2. The least effective method is:

Some of the samples may burn. Wear safety goggles to protect your eyes and oven gloves to protect your hands.
How do different textiles burn?

For this experiment, you need the same equipment that you used to test your fire retardant samples. A few fibres of different textiles, for example woollen cloth or knitting yarn, cotton fabric, and synthetic fabric such as nylon or polyester will be useful.

One person will conduct the experiment while the rest of the class will observe, draw up a table like the one below, and record their observations in their table. Follow the same safety rules as you did when you tested your fire retardant samples.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Approaching the flame</th>
<th>In the flame</th>
<th>When removed from the flame</th>
<th>Smell</th>
<th>Remains after burning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Compare your observations with the information below. Now you will know what textiles your samples were made of. Fill in the textiles in your observation table.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Approaching the flame</th>
<th>In the flame</th>
<th>When removed from the flame</th>
<th>Smell</th>
<th>Remains after burning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal fibres such as wool</td>
<td>Shrinks away</td>
<td>Burns slowly</td>
<td>Smoulders and then the flame dies</td>
<td>Burning hair</td>
<td>Dark blob that turns to powder when touched</td>
</tr>
<tr>
<td>Plant fibres such as cotton</td>
<td>Pulls towards the flame</td>
<td>Burns quickly</td>
<td>Continues to burn</td>
<td>Paper burning</td>
<td>Grey, feathery ash</td>
</tr>
<tr>
<td>Synthetic fibres such as nylon and polyester</td>
<td>Tip starts to melt</td>
<td>Burns and melts</td>
<td>Continues to melt</td>
<td>Acid</td>
<td>Hard blob of plastic</td>
</tr>
</tbody>
</table>

1. Which of the textiles is the least flammable?
In the next lesson, you will waterproof a piece of fabric that you will use to cover your model. You will need a piece of fabric of at least \(50 \, \text{cm} \times 50 \, \text{cm}\) in size.

**Make Part 1: Waterproof the fabric for the model** (30 minutes)

You have to make fabric waterproof, so that it is ready to be used to cover your model emergency shelter. Use a piece of cotton fabric of at least \(50 \, \text{cm} \times 50 \, \text{cm}\). The fabric need not be in one piece. You may sew pieces together to create the right-sized square. Take care to make strong joints that you can waterproof well.

**Week 3**

**Design Part 1: Design and sketch the model shelter**

(30 minutes)

**Write a design brief and specifications**

Go back to the situation and read through it carefully. Also make a note what the disaster management teams expect from you. Remember that you are building a model, so you must consider the scale of the model. If you are using your cloth of \(50 \, \text{cm} \times 50 \, \text{cm}\), and you use a scale of 10:1, the actual shelter would be \(5 \, \text{m} \times 5 \, \text{m}\). Would this be big enough for six people?

1. Write a design brief. [3]
2. Identify and list the specifications you have been given. [9]

[Total: 12]

**Design Part 2: Design sketch**

(30 minutes)

**Make a sketch of your design**

1. Make a rough pencil sketch of a possible solution.
2. Label your drawing to show the different parts of the model shelter.
3. Identify the materials you will use. [Total: 20]
Make Part 2: Construct the model

(30 minutes × 2 = 60 minutes)

Build your model
1. Collect all the materials and equipment you need for your model.
2. Decide how you are going to go about building the model.
3. Think about any safety measures you have to consider.
4. Only now can you start building the model.
5. Once the model is finished, check that you have met all the specifications. The specifications become the features of the model emergency shelter.
6. Make sure that you considered the health and safety of the disaster victims.
7. Make adjustments if needed.

Your teacher will look at the following
• Can the model be transported easily?
• Can it be set up and packed away quickly and easily?
• Can six people live in it comfortably for a month?
• Is it windproof and waterproof?
• Is the waterproofing effective? (Consider the health of the victims.)
• Is it safe? (Consider the dangers of fire.)
• Is it well built and sturdy?

Good luck, and do your best! [Total: 28]