



In this Chapter

- ★ How Groups are Created
- ★ Modifying Smoothing Groups
- ★ Regrouping Faces
- ★ Renaming Groups
- ★ The Effect of Smoothing Groups
- ★ Using Groups to Select and Hide Faces

Groups

Introduction

A group is an identity given to a set of faces. There are two main types of groups within Milkshape: **mesh groups** and **smoothing groups**.

Mesh groups (called simply *groups* in Milkshape) are important because they make selecting multiple faces within a complex model simpler and they also play an essential part when texturing a model. Normally, every primitive object we create in our model constitutes a separate group. Each group is automatically assigned a name when it is created and these names are listed in the Control Panel's *Groups* page.

The effects created by smoothing groups are only visible when the 3D viewport is set to **Smooth Shaded** or **Textured** mode.

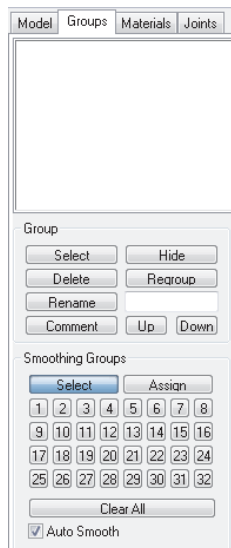
Smoothing groups are used to determine how a set of faces should be shaded. Faces belonging to the same smoothing group will have only slight differences in shading from one face to the next. For example, all the faces in a sphere will belong to the same smoothing group since the surface of a sphere should be smooth with individual faces not easily seen. On the other hand, faces on adjacent sides of a box will belong to different smoothing groups because there is a sharp edge between one side and the next. In general, then, faces belong to the same smoothing group if they meet each other at a slight angle and the finished result should be a smooth transition from one face to the next; faces belong to different smoothing groups if there is to be a sharp distinction in the shading between each set of faces - generally when there is a large angular difference between the sets of faces. Smoothing groups are assigned numbers rather than names.

A face will belong to exactly one mesh group and one smoothing group, but a group can contain many faces.

Milkshape's Control Panel contains a tagged page specifically for handling groups (the *Groups* page) which is shown in FIG-8.1.

FIG-8.1

The Control Panel's Groups Page



The white box at the top of the page is used to list the names of every mesh group in the currently loaded model.

The *Group* panel contains mostly buttons for manipulating the mesh groups.

The *Smoothing Groups* panel contains controls for manipulating smoothing groups.

An important characteristic to bear in mind is that as we move from the *Model* page of the Control Panel to the *Groups* page, the current selection in the *Model* page remains active. For example, if we had clicked on the **Move** button in the *Model* page immediately before changing to the *Groups* page, should we then drag the mouse within one of the orthogonal viewports, any currently selected vertices or faces will be moved.

Mesh groups

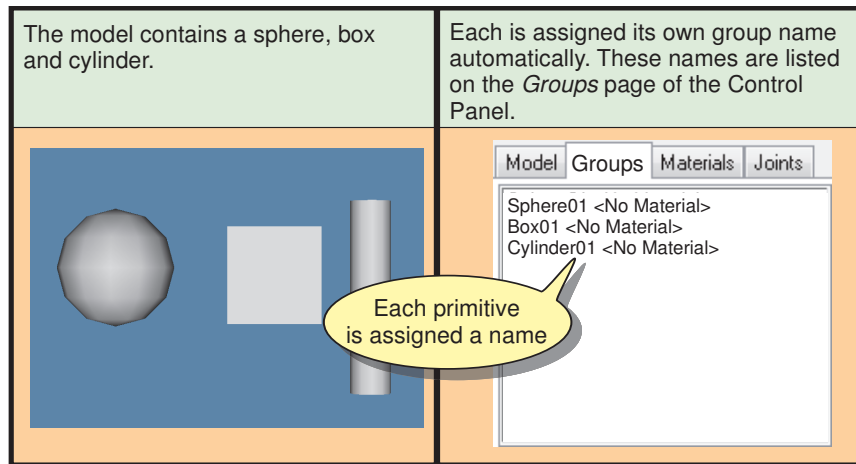
Renaming Groups

The model in FIG-8.2 contains 3 primitives and each is automatically assigned a group name which is listed on the *Groups* page of the Control Panel.

FIG-8.2

Each Primitive Shape is a Named Group

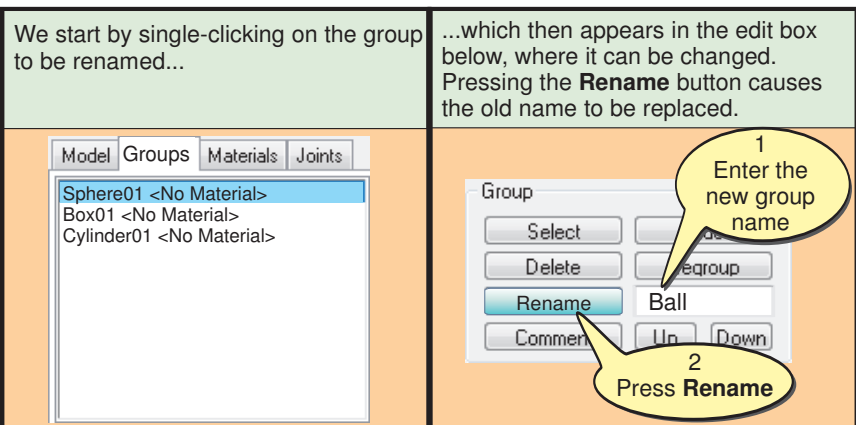
The term *<No Material>* shown beside each group refers to the fact that no texturing material has yet been assigned to the group.



Since the names assigned to the groups have little meaning in the context of the model we are creating, it will be helpful to assign a more relevant name to each group (see FIG-8.3).

FIG-8.3

Renaming Groups



Activity 8.1

This model is used in the next three Activities.

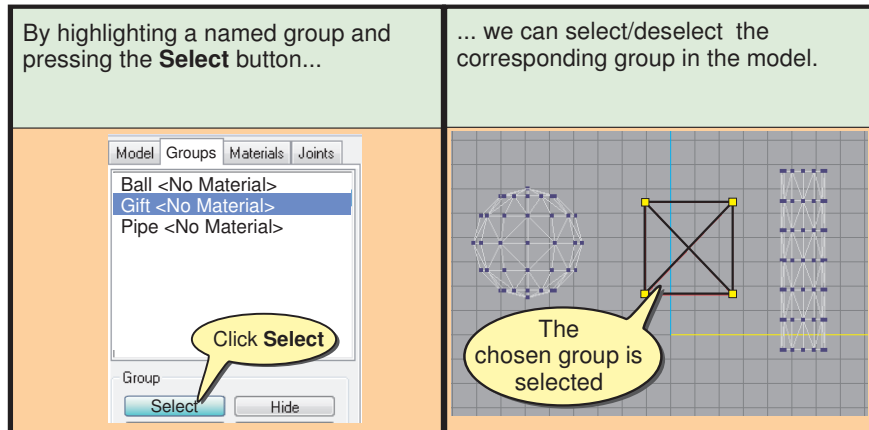
Create a new Milkshape project containing a sphere, box and cylinder. Rename the three groups as *Ball*, *Gift* and *Pipe*.

Selecting Groups

The vertices and faces that make up a group can be selected using the **Select** button (see FIG-8.4).

FIG-8.4

Selecting Groups



You can also select a group's faces by just double-clicking the appropriate entry in the *Groups* list.

Pressing the **Select** button again or a second double-click of the appropriate list entry will deselect the group.

Activity 8.2

Using the model created in Activity 8.1, make use of both selection methods described above to select the *Ball* and *Gift* groups. Deselect both groups.

All the faces within a group can also be selected from the *Model* page of the Control Panel. To do this, first click on the **Select** button in the *Tools* panel and then the **Group** button in the *Select Options* panel. Now click on a face within one of the orthogonal viewports and all of the vertices and faces belonging to the same group as that face will be selected. To select more than one group, hold down the *Shift* key while clicking within each group.

Activity 8.3

Using the same model as before, select both the *Ball* and *Gift* groups using the **Select** and **Group** buttons on the *Model* page.

Save the model as *Groups01.ms3d*.

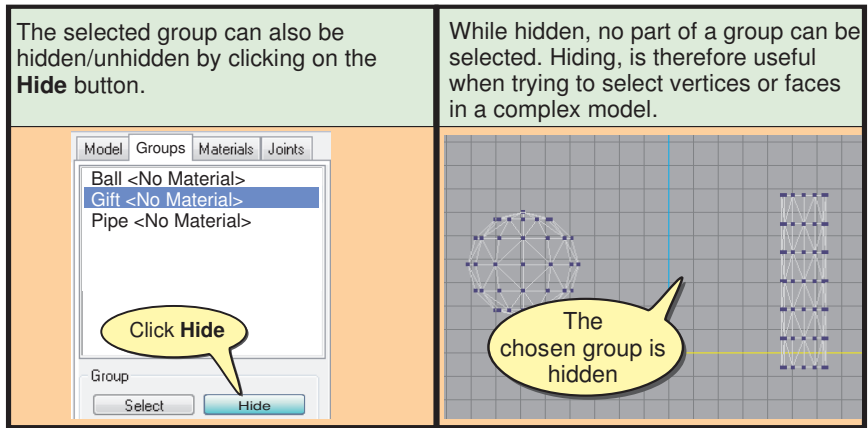
Hiding Groups

We've seen in previous chapters that it can, on occasion, be useful to hide sections of a model. To hide all the faces of a group, highlight the group in the list and press the **Hide** button (see FIG-8.5).

Pressing the **Hide** button a second time will unhide the faces of the group.

FIG-8.5

Hiding the Faces of a Group



Activity 8.4

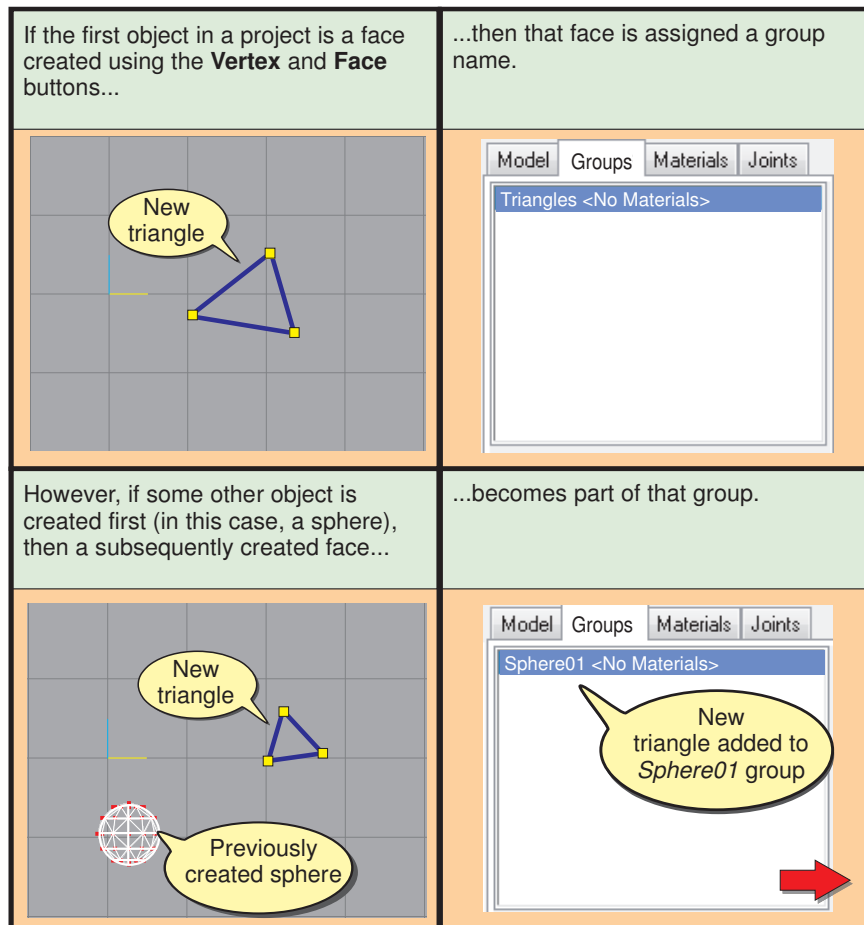
Reload *Groups01.ms3d* and use the method shown in FIG-8.5 to hide the *Gift* group of faces. Click the **Hide** button a second time to unhide the faces.

Group Creation

Although each primitive we add to a model is usually given its own group identity, this is not always true when creating a new face as demonstrated in FIG-8.6.

FIG-8.6

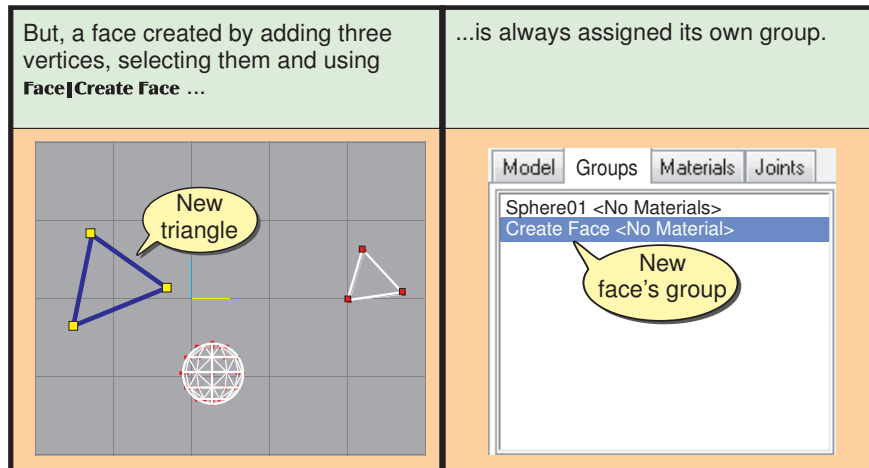
How New Faces are Grouped



Where several groups already exist, the new face is always added to the top group in the list.

FIG-8.6
(continued)

How New Faces are Grouped



Activity 8.5

Start a new Milkshape project.

Create a single triangle using the **Vertex** and **Face** buttons on the *Model* page.

What is the name of the group created by this operation?

Add a sphere to the model.

Add a second triangle to the model, again using the **Vertex** and **Face** buttons.

What group has the second triangle been added to?

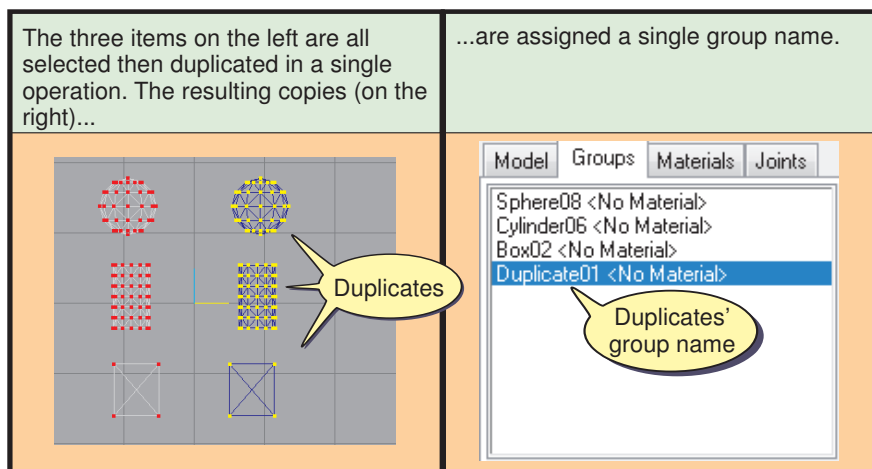
Add a third triangle using the **Vertex** button and **Face|Create Face**.

How is the groups list affected by the third triangle?

Another situation that is handled in an unexpected manner is duplication of groups. For example, if we have an existing sphere, cylinder and box, which are subsequently all selected and duplicated in a single operation, then the three duplicated items are assigned a single group name (see FIG-8.7).

FIG-8.7

Duplicating Multiple Groups



In order to assign a separate name to each duplicated group, it is necessary to copy the originals one at a time.

Activity 8.6

Reload your model *Groups01.ms3d*.

Create a duplicate of the three existing objects so that three new groups are created.

Name the three new groups *Ball2*, *Gift2* and *Pipe2* - assigning the names appropriately.

Resave your model.

Other Minor Operations

Other buttons within the *Groups* panel are:

Delete

Deletes the selected group from the model.

Comment

Allows a comment to be associated with the group. Useful for reminding you of the purpose of a group.

Up

Moves the highlighted group up the listings order. This has no effect on the actual group of vertices.

Down

Moves the highlighted group down the listings order.

Activity 8.7

Reload your model *Groups01.ms3d*.

Rearrange the order of the groups as shown in the groups list, placing them in the order, *Pipe*, *Pipe2*, *Gift*, *Gift2*, *Ball*, *Ball2*.

Resave your model.

Regrouping

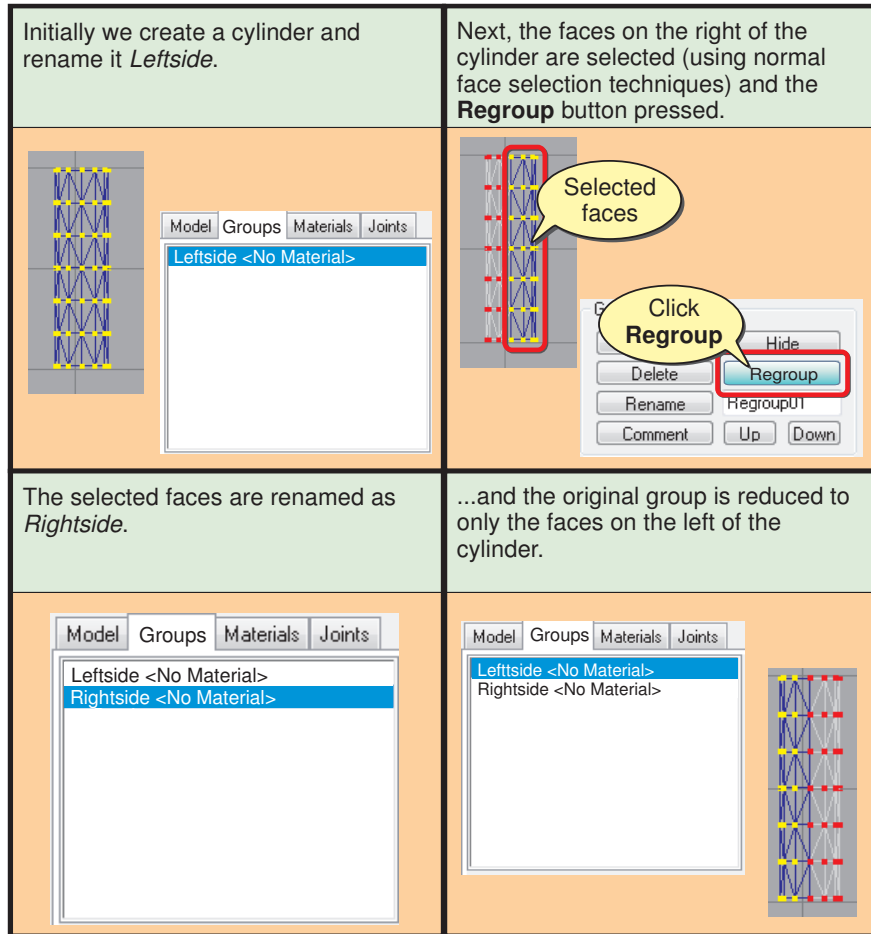
The faces in a single group can be split into two or more separate groups. Again, this can be useful when it comes to hiding sections of a model, allowing easier access to individual vertices and faces, but a more important reason for splitting groups involves texturing (which is covered in the next chapter).

Conversely, two or more groups can be merged into a single group.

For the moment we'll content ourselves with learning how to split a primitive shape into several groups. FIG-8.8 shows the steps required to split a cylinder into two groups.

FIG-8.8

Regrouping Faces



A face cannot belong to more than one group.

The faces to be assigned to a new group are selected in the normal way using the **Select** button in the *Model* page of the Control Panel. Remember to click **Faces** in the *Select Options* panel and check or uncheck *Ignore Backfaces* as appropriate.

Activity 8.8

Start a new Milkshape project.

Create a 6 x 12 cylinder about 4 units high and 2 units in diameter.

Divide the cylinder into four groups: *Topcap*, *Bottomcap*, *Leftside*, and *Rightside*.

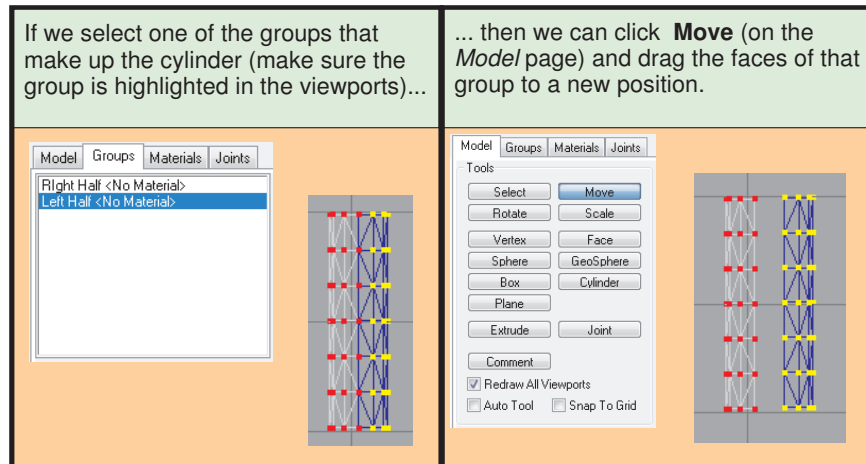
Save the model as *Groups02.ms3d*.

Once a group has been created in this way, the faces it contains have effectively been unwelded from the original mesh meaning that the group can be moved, scaled or rotated independently from the remainder of the original primitive.

In FIG-8.9 we see how the newly formed group *Regroup01* (as shown in FIG-8.8), is moved away from the remainder of the original cylinder mesh.

FIG-8.9

Each Group can be Transformed Independently



Activity 8.9

Reload *Groups02.ms3d*.

Move the four groups slightly apart.

Scale the *Leftside* group so that it is half its original dimensions in the x and y directions.

Resave the model.

Activity 8.10

Start a new Milkshape project.

Create a perfect cube measuring 4 units in each dimension.

Make each side of the cube a group and name these *One*, *Two*, *Three*, etc. Name opposing sides so that the numeric equivalent always add up to 7 (e.g. group *One* should be opposite group *Six*).

Save the model as *Dice.ms3d*.

Just as we can split a group into several new groups, so we can merge multiple groups into a single group (this does not affect the actual positions of the faces within those groups being merged). This can be useful if we want to treat what were separate groups as a single entity which can be moved, scaled, or rotated.

To merge groups, just select the faces of those groups involved and press the **Regroup** button. The original group names will disappear from the groups list.

Activity 8.11

Reload your model, *Groups02.ms3d*.

Merge its components into a single group called *Splitcylinder* and rotate the object by 90° about the z-axis on its centre of mass.

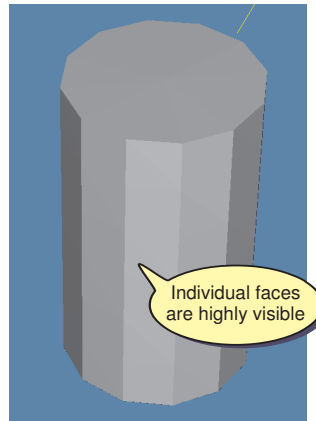
Smoothing Groups

The Effect of Smoothing Groups

When a model is viewed in 3D mode using the flat shading view, the individual faces that make up the model can be quite obvious (see FIG-8.10).

FIG-8.10

Flat Shading

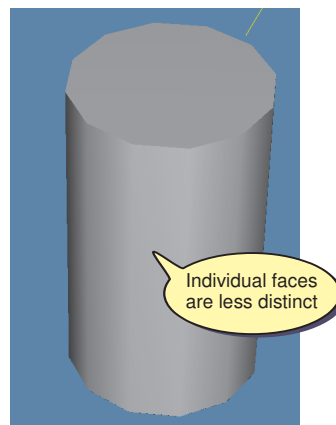


Notice that some of the faces in the cylinder cap appear to merge into a single smooth surface, while other faces that are at a slight angle to each other (as in the side of the cylinder), stand out, thereby destroying the illusion of a curved surface.

But if we change to the smooth shading view, the edges between each of the side faces become less distinct giving the surface a rounder, smoother appearance (see FIG-8.11).

FIG-8.11

Smooth Shading



However, if we examine FIG-8.11 more closely, we'll see that the shading between the top cap of the cylinder and the side are still as distinct as in the previous image.

Automatic Smoothing Group Creation

When a primitive is first created it is assigned one or more smoothing groups.

Any faces that belong to the same smoothing group are blended together to give the appearance of a smooth surface when the model is displayed in the 3D viewport using **Smooth Shaded** mode.

As a general rule, faces at an angle of less than 90° to each other belong to the same smoothing group.

The faces on the side of the cylinder all belong to the same smoothing group and hence we see a smooth, curving effect when viewing the side in smooth shaded mode. However, since the top cap of the cylinder (which is at 90° to the side) belongs to another group, there is an obvious difference in shading between the side and cap surfaces.

To minimise the number of shading groups allocated to a primitive, Milkshape will often place disconnected faces in the same smoothing group. Because these faces are not touching, there is no attempt by the program to create a smoothing effect between them. For example, the faces in the two caps of a cylinder all belong to the same smoothing group, but since they are separated from each other by the curved side of the cylinder, this has no effect on how the shading appears in the 3D viewport.

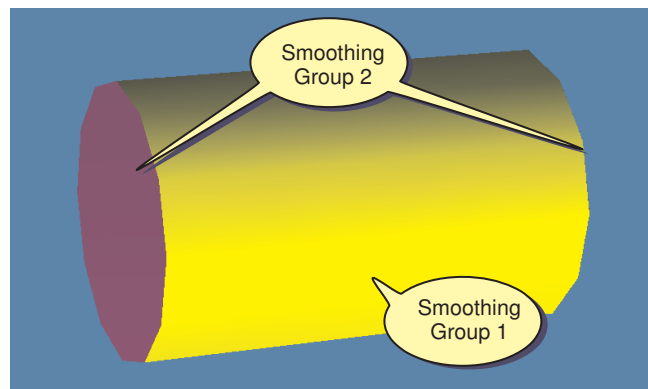
Unlike mesh groups, smoothing groups are not assigned names. Instead they are assigned numbers. For example, while a cylinder will by default, be assigned to a single mesh group with a name such as *Cylinder01*, the two smoothing groups within that cylinder will be assigned the values 1 and 2.

While mesh group names appear in the *Group* page's main list, there is no obvious way of discovering how many smoothing groups have been assigned to an object.

One way of identifying the smoothing groups within a single object is to select the **Coloured Smoothing Groups** option from the 3D viewport's pop-up menu. This assigns artificial colours to the model, with faces belonging to the same smoothing group being displayed in the same colour. FIG-8.12 shows colour-coded smoothing groups of a cylinder.

FIG-8.12

Coloured Smoothing Groups



This model will be used in the next Activity.

Make sure **Coloured Smoothing Groups** is deselected in the 3D viewport before completing the Activity.

Activity 8.12

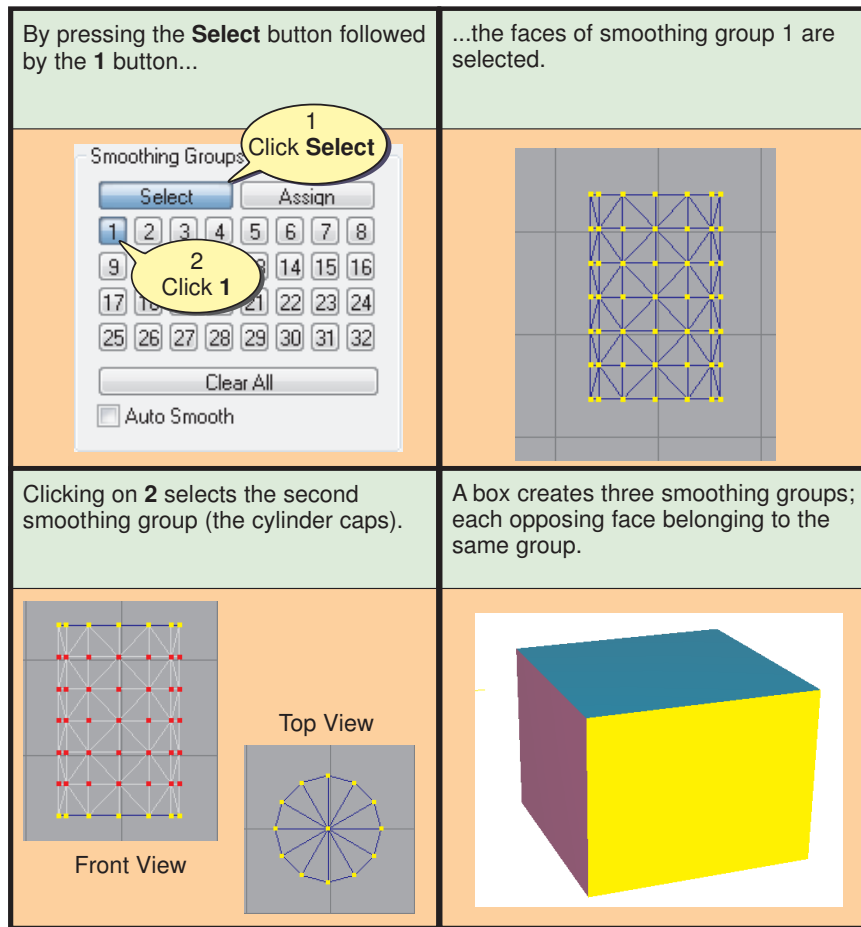
Start a new Milkshape project then create a closed 6 x 12 cylinder about 4 units high and 2 units in diameter.

In the 3D viewport, select **Coloured Smoothing Groups** and identify which faces belong to which smoothing group.

Also, by using options in the *Smoothing Groups* panel we can select the faces that make up any of the existing smoothing groups (see FIG-8.13).

FIG-8.13

Automatic Smoothing Groups



By pressing the **Select** button followed by the **1** button...

...the faces of smoothing group 1 are selected.

Clicking on **2** selects the second smoothing group (the cylinder caps).

A box creates three smoothing groups; each opposing face belonging to the same group.

Activity 8.13

Using the cylinder you created in the last Activity, select the faces belonging to smoothing group 1.

What faces are selected when you click on smoothing group 2? What faces are selected when you click on smoothing group 3?

Remove the cylinder from your model.

Create a cube about 4 units in each dimension.

Select the faces in each smoothing group of the model.

How many smoothing groups are assigned to a sphere?

Surprisingly, when new primitives are placed within a model their faces are added to existing smoothing groups where possible.

For example, if we start with a cylinder (which forms smoothing groups 1 and 2) and then add a box, two sides of the box will be added to group 1 and another two to group 2; the final two sides of the box form a new smoothing group 3. This is easily seen by selecting the **Colored Smoothing Groups** option from the 3D viewport's pop-up menu before adding the cylinder and box to a new model.

Activity 8.14

Start a new Milkshape project.

Select the **Colored Smoothing Groups** option from the 3D viewport's pop-up menu.

Add a cylinder to the project (size is irrelevant).

Add a box to the model.

Add a sphere to the model.

How many smoothing groups are formed by the model?

Deselect the **Colored Smoothing Groups** option.

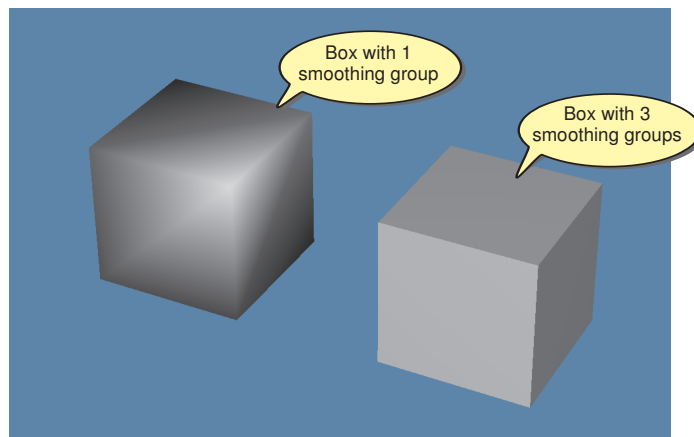
Manually Assigning Smoothing Groups

Although faces are automatically assigned to specific smoothing groups, we can destroy those groupings, reassign faces to other groups, or even create new groups.

The **Clear All** button in the *Smoothing Groups* panel destroys the existing smoothing groups' allocation by placing every face within a model into smoothing group 1. Without distinct smoothing groups, the shading process within the 3D viewport attempts to create a smoothing effect between every face - even those at 90° to each other - this creates an unrealistic shading on the surface of the model (see FIG-8.14).

FIG-8.14

Clearing Smoothing
Groups Destroys
Realistic Shading



When faces are reassigned to new smoothing groups, the necessary calculations required to show the effects of this change are only performed automatically if the *Auto Smooth* check box at the bottom of the *Smoothing Groups* panel is checked. Should this option be unchecked when the faces are reallocated, there will be no visible difference to the model (although the reassignment will still take place). As a general rule, the *Auto Smooth* option should remain checked at all times.

Should you create new smoothing groups while the *Auto Smooth* option is unchecked, all is not lost; you can still force the necessary recalculations by selecting **Face|Smooth All** from the main menu.

Activity 8.15

Start a new Milkshape project.

Create a cube about 6 units in each dimension.

In the *Smoothing Groups* panel of the *Groups* page, make sure *Auto Smooth* is checked, then reduce the number of smoothing groups in the model to 1.

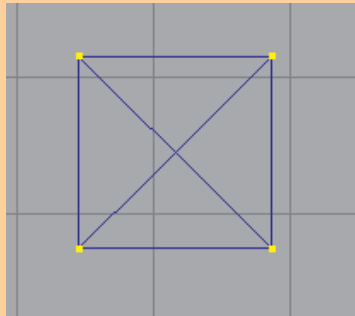

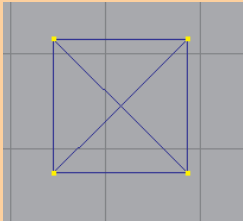
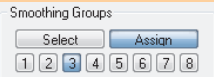
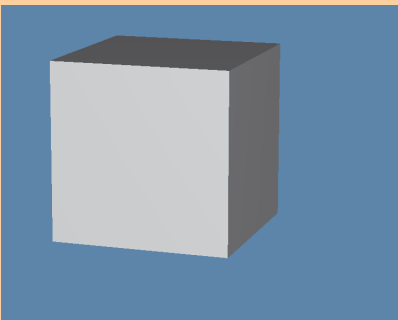
Observe the effects of this on the model's shading when in **Smooth Shaded** mode in the 3D viewport.

This model is used in the next Activity.

By using the **Assign** button in the *Smoothing Groups* panel, we can assign selected faces to a new smoothing group. In FIG-8.15 we start with a cube which has had its faces assigned to a single smoothing group and reassign its faces to smoothing groups 1, 2 and 3 as appropriate.

FIG-8.15

Reassigning Faces to Other Smoothing Groups

<p>With all the faces in the box assigned to smoothing group 1, we start by selecting the faces in the <i>Front</i> view (<i>Ignore Backfaces</i> is unchecked)</p>	<p>These selected faces (four in total) are assigned to smoothing group 2.</p>
	
<p>Next, the faces from the <i>Left</i> viewport are selected and assigned to smoothing group 3.</p>	<p>With each adjoining side in different smoothing groups, our cube returns to its normal shading.</p>
 	

Activity 8.16

Using the model you created in the previous Activity, reassign three smoothing groups to your cube as shown in FIG-8.15.

Shading Problems with the Fin Model

At the end of Chapter 7 we created a "fin" shape by modifying a sphere and adding new faces. However, there was a problem with the shading of the final model which we could see when viewing it in the 3D viewport. This was caused by faces being automatically assigned to inappropriate smoothing groups.

Activity 8.17

Load *Fin.ms3d*.

Examine the shading of the model in the 3D viewport (make sure the **Smooth Shading** option is selected).

Switch on the **Colored Smoothing Groups** option.

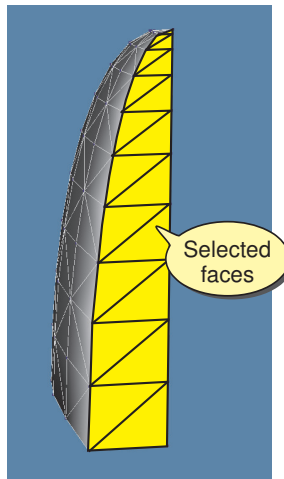
How many smoothing groups are in the model?

So now we see what is causing the shading problem in the model - all faces belong to a single shading group. To achieve a more realistic model we need to create new smoothing groups for the new faces we added to the model, since these are at a 90° angle to the faces that were on the original sphere.

Activity 8.18

With the *Fin.ms3d* model loaded, select **Tools | Selection Editor**.

Use the editor to select the new faces we added along the long vertical side of the model (see diagram).



Assign the selected faces to smoothing group 2.

Select the other faces that were added to the model (on the short horizontal side) and assign these to smoothing group 3.

How is the shading of the model affected by these changes?

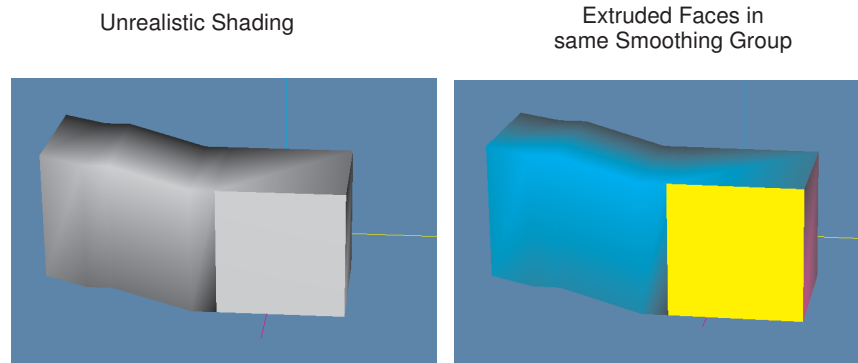
Resave the model.

Smoothing Groups and Extrusions

It's this same problem of faces being assigned to inappropriate smoothing groups that causes problems with extrusions. We can see in FIG-8.16 that the unrealistic shading on the extruded surfaces of the model *Extrude01.ms3d* is caused by the new faces being assigned to the same smoothing group.

FIG-8.16

Extruded Faces are Assigned to the Same Smoothing Group



Activity 8.19

Reload your model *Extrude01.ms3d* and reallocate the extruded faces to appropriate smoothing groups.

Resave your model.

If, despite faces being correctly allocated to appropriate smoothing groups, the shading of the model still looks wrong, this is probably caused by the vertices in any new faces not being correctly welded to those in existing faces. Try selecting the vertices of the faces involved and then use **Vertex|Weld Together** - this should solve the shading problems.

Smoothing Groups and Modified Cylinders and Spheres

Back in Chapter 4 we saw how to create new shapes by specifying low values for the stacks and slices parameters of cylinders and spheres. However, these shapes can suffer from shading problems when viewed in the 3D viewport. This is caused by the faces which are at acute angles to each other being assigned to the same smoothing group (after all, when using standard stacks and slices values, these faces would belong to the same gently curving surface). Just assign each of the faces to different smoothing groups to achieve correct shading.

Activity 8.20

Start a new Milkshape project.

Create a 1 stack, 4 slice, closed cylinder about 6 units high and 1 unit in diameter. This will produce a long, box-shaped object.

In the 3D viewport, observe how the object you have created is shaded (make sure you are in **Smooth Shaded** mode).

continued on next page

Activity 8.20 (continued)

Again in the 3D viewport, select **Colored Smoothing Groups** from the pop-up menu.

How many smoothing groups are used in the object? How many smoothing groups are used by the long sides of the object?

Select two opposing long sides of the object and assign them to smoothing group 3.

How many smoothing groups are in the object now?

Switch off the **Colored Smoothing Groups** option and observe the difference in the object's shading.

Summary

- A group is a collection of faces.
- Milkshape makes use of two types of groups: mesh groups and smoothing groups.
- Mesh groups are a convenient way of grouping sets of faces so they can be more easily selected.
- Mesh groups are also used when a model is being textured.
- Smoothing groups are used to determine the shading of a model's surface.
- Each new primitive within a model is automatically assigned its own mesh group.
- Mesh group names are generated automatically.
- Mesh groups can be renamed.
- By selecting a group name, the faces in that group can be selected, hidden or deleted.
- The order in which the group names appear within the names list can be reorganised.
- When faces are duplicated in a single operation, all the duplicated faces belong to the same mesh group.
- Faces can be assigned to new mesh groups.
- Smoothing groups are assigned numeric values, not names.
- Adjoining faces within the same smoothing group create a smooth shading effect within the 3D viewport when the **Smooth Shaded** option is selected.
- Smoothing groups are allocated automatically every time a primitive is created.

- ❖ Disjointed faces may share the same smoothing group, since this will have no effect on the shading produced.
- ❖ The shading of new smoothing groups is calculated automatically only when the *Auto Smooth* check box is selected.
- ❖ Recalculation of the shading of all smoothing groups can be achieved by selecting **Face|Smooth All**.
- ❖ When adjoining faces that are at 90° or more to each other are included in the same smoothing group, unrealistic shading is produced.
- ❖ Extruded faces belong to the same smoothing group and will often have to be reallocated to achieve realistic shading.
- ❖ Unrealistic shading can also be caused by unwelded vertices.
- ❖ All the faces in a model can be allocated to a single smoothing group by clicking on the **Clear All** button in the *Smoothing Groups* panel of the *Groups* page of the Control Panel.
- ❖ The smoothing groups used within a model can be seen in a colour-coded form by selecting the **Colored Smoothing Groups** option from the 3D viewport's pop-up menu.

Solutions

Activity 8.1

Start a new Milkshape project.
Create a sphere, box and cylinder (sizes are not relevant).
Click the *Groups* tag in the Control Panel.
Click on the first group name in the groups list (this should be *sphere01* - the number may be different).
In the *Group* panel:
Enter *Ball* in the edit box beside the **Rename** button.
Press the **Rename** button.
Click on the box name in the main list.
In the *Group* panel:
Enter *Gift* in the edit box beside the **Rename** button.
Press the **Rename** button.
Click on the cylinder name in the main list.
In the *Group* panel:
Enter *Pipe* in the edit box.
Press the **Rename** button.

Activity 8.2

Using the model created in Activity 8.1, make sure no part of the model is currently selected.
Click the *Groups* tag in the Control Panel.
Click on the *Ball* group name in the group list.
In the *Group* panel, click **Select**.
Double click on the *Gift* group name in the group list to select it.

Deselect the *Ball* group by double-clicking its entry in the groups list.
Deselect the *Gift* group by double-clicking its entry in the groups list.

Activity 8.3

Using the model created in Activity 8.1, make sure no part of the model is currently selected.
Click the *Model* tag in the Control Panel.
Click the **Select** button.
In the *Select Options* panel:
Click on the **Group** button.
In one of the orthogonal viewports, click anywhere within the sphere (this will select the *Ball* group).
Shift + click anywhere within the box (this will select the *Gift* group).

Save the model as *Groups01.ms3d*.

Activity 8.4

Reload *Groups01.ms3d*.
Make sure no part of the model is currently selected.
Click on the *Groups* tag of the Control Panel.
Click on the *Gift* entry in the groups list.
Click the **Hide** button (this hides the faces of the box).
Click the **Hide** button (this will unhide the faces).

Activity 8.5

Start a new Milkshape project.
Press the *Model* tag in the Control Panel.
Press the **Vertex** button.

Create three vertices by clicking in an orthogonal viewport.
Press the **Face** button.
Click the vertices in counterclockwise order to create a face.
Press the *Groups* tag in the Control Panel.
The face is listed as *Triangles* in the group list.

Press the *Model* tag in the Control Panel.
Click **Sphere**.
Drag within an orthogonal viewport to create a sphere (this will create a new group called *Sphere02*).
Press the **Vertex** button.
Create three vertices by clicking in an orthogonal viewport.
Press the **Face** button.
Click the vertices in counterclockwise order to create a face.
Press the *Groups* tag in the Control Panel.
The groups list now contains two entries: *Triangles* and *Sphere02*.
Make sure no part of the model is currently selected.
Double click the *Triangles* entry.
Both triangles will be highlighted. The second triangle has been added to the first entry (*Triangles*) in the groups list.

Press the *Model* tag in the Control Panel.
Press the **Vertex** button.
Create three vertices by clicking in an orthogonal viewport.
Select all three vertices.
Select **Face|Create Face**.
Press the *Groups* tag in the Control Panel.
The groups list now contains three entries: *Triangles*, *Sphere02*, and *Create Face*.

Activity 8.6

Reload *Groups01.ms3d*.
Make sure no part of the model is selected.
Click the *Model* tag in the Control Panel.
Click the **Move** button.
In the *Move Options* panel, make sure the **X**, **Y** and **Z** buttons are pressed.
Click the *Groups* tag in the Control Panel.
Double click the *Ball* entry in the groups list.
Press **Ctrl+D** to duplicate the selected group.
Move the mouse to an orthogonal viewport and drag the duplicated sphere away from the original.
Double click the duplicate's entry in the groups list (probably called *Duplicate01*) to deselect it.
In the *Group* panel:
Enter the name *Ball2* in the edit box.
Press **Rename**.
Double click the *Gift* entry in the groups list.
Press **Ctrl+D** to duplicate the selected group.
Move the mouse to an orthogonal viewport and drag the duplicated box away from the original.
Double click the duplicate's entry in the groups list (probably called *Duplicate02*) to deselect it.
In the *Group* panel:
Enter the name *Gift2* in the edit box.
Press **Rename**.
Double click the *Pipe* entry in the groups list.
Press **Ctrl+D** to duplicate the selected group.
Move the mouse to an orthogonal viewport and drag the duplicated cylinder away from the original.

Double click the duplicate's entry in the groups list (probably called *Duplicate03*) to deselect it.

In the *Group* panel:

Enter the name *Pipe2* in the edit box.

Press **Rename**.

Resave your model.

Activity 8.7

Reload *Groups01.ms3d*.

The current order of the groups list entries should be:

Ball, Gift, Pipe, Ball2, Gift2, Pipe2

Click the *Groups* tag in the Control Panel.

Click the *Pipe* entry in the groups list.

Press the **Up** button twice to bring *Pipe* to the top of the list.

Click the *Pipe2* entry in the groups list.

Press the **Up** button four times to bring *Pipe2* to position 2 in the list.

Click the *Gift* entry in the groups list.

Press the **Up** button once to bring *Gift* to position 3 in the list.

Click the *Gift2* entry in the groups list.

Press the **Up** button twice to bring *Gift2* to position 4 in the list.

Resave the model.

Activity 8.8

Start a new Milkshape project.

Create a 6x12 cylinder 4 units high and 2 units in diameter.

Click the *Groups* tab in the Control Panel.

Click on the group name in the group list.

In the *Group* panel:

Enter *Leftside* in the edit box beside the **Rename** button.

Press the **Rename** button.

Press the **Select** button in the *Tools* panel of the model page.

Press **Faces** in the *Select Options* panel.

Uncheck *Ignore Backfaces*.

In the *Front* viewport:

Select the faces on the right-hand side of the cylinder (as seen from your perspective).

Select the *Groups* tag in the Control Panel.

Click the **Regroup** button (this creates a new group for the selected faces).

Enter *Rightside* in the edit box.

Press the **Rename** button.

Select the *Model* tag in the Control Panel.

Check *Ignore Backfaces*.

In the *Top* viewport, select the faces in the top cap of the cylinder.

Select the *Groups* tag in the Control Panel.

Click the **Regroup** button.

Enter *Topcap* in the edit box.

Press the **Rename** button.

Change the viewpoint in the bottom-left viewport from *Top* to *Bottom*.

In the *Bottom* viewport, select the faces in the bottom cap of the cylinder.

Click the **Regroup** button.

Enter *Bottomcap* in the edit box beside the **Rename** button.

Press the **Rename** button.

Return the viewpoint in the bottom-left viewport to *Top*.

Save the model as *Groups02.ms3d*.

Activity 8.9

If necessary, reload the model *Groups02.ms3d*.

Ensure no elements of the model are currently selected.

Click the *Model* tab in the Control Panel.

Press the **Move** button.

Ensure the the **X**, **Y** and **Z** buttons in the *Move Options* panel are all pressed.

Click the *Groups* tab in the Control Panel.

Double click the *Rightside* name in the groups list (this selects the associated faces in the model).

In the *Front* viewport, drag the faces away to the right.

Double click the group name again to deselect the faces.

Double click the *Leftside* name in the groups list.

In the *Front* viewport, drag the faces away to the left.

Double click the group name again to deselect the faces.

Double click the *Topcap* name in the groups list.

In the *Front* viewport, drag the faces away upwards.

Double click the group name again to deselect the faces.

Double click the *Bottomcap* name in the groups list.

In the *Front* viewport, drag the faces away downwards.

Double click the group name again to deselect the faces.

Double click the *Leftside* name in the group list.

Click the *Model* tab in the Control Panel.

Press the **Scale** button.

In the *Scale Options* panel:

Select *Center of Mass*.

Enter 0.5 in the X and Y boxes.

Make sure only the **X** and **Y** buttons are pressed.

Press the **Scale** button.

Resave the model.

Activity 8.10

Start a new Milkshape project.

Create a cube 4 units in each direction.

Press the **Select** button in the *Tools* panel.

Press **Face** in the *Select Options* panel.

Check *Ignore Backfaces*.

In the *Front* viewport:

Select the two faces on the front of the cube.

Click the *Groups* tab in the Control Panel.

Click the **Regroup** button.

Enter *One* in the edit box beside the **Rename** button.

Press the **Rename** button.

Change the top-left's viewport from *Front* to *Back*

In the *Back* viewport, select the two faces showing.

Click the **Regroup** button.

Enter *Six* in the edit box.

Press the **Rename** button.

Reset the top-left viewport to *Front* view.

In the *Left* viewport, select the two faces showing.

Click the **Regroup** button.

Enter *Two* in the edit box.

Press the **Rename** button.

Change the top-right's viewport from *Left* to *Right*.

In the *Right* viewport, select the two faces showing.

Click the **Regroup** button.

Enter *Five* in the edit box.

Press the **Rename** button.

Reset the top-right viewport to *Left* view.
 In the *Top* viewport, select the two faces showing.
 Click the **Regroup** button.
 Enter *Three* in the edit box.
 Press the **Rename** button.
 Change the bottom-left's viewport from *Top* to *Bottom*.
 In the *Bottom* viewport, select the two faces showing.
 Click the **Regroup** button.
 Enter *Four* in the edit box.
 Press the **Rename** button.
 Reset the bottom-left viewport to *Bottom* view.

Save the model as *Dice.ms3d*

Activity 8.11

Reload the model *Groups02.ms3d*.
 Select all the faces within the model.
 On the *Groups* page of the Control Panel:
 Press the **Regroup** button.
 Enter *Splitcylinder* as the group name.
 Press **Rename**.
 Make sure the complete model is still selected.
 On the *Model* page of the Control Panel:
 Press **Rotate**.
 In the *Rotate Options* panel:
 Select *Center of Mass*.
 Enter 90 in the Z box.
 Make sure only the **Z** button is pressed.
 Press **Rotate**.

Activity 8.12

Start a new Milkshape project.
 Create a 6x12 closed cylinder 4 units high and 2 units in diameter.
 In the 3D viewport, select **Colored Smoothing Groups** from the pop-up menu.
 From the colours displayed, we can see that there are two smoothing groups. The side of the cylinder forms one group; the two caps form the other.

Uncheck **Colored Smoothing Groups** from the 3D viewport's pop-up menu.

Activity 8.13

Make sure no part of the cylinder is selected.
 In the 3D viewport, select **Colored Smoothing Groups** from the pop-up menu.
 In the *Groups* page of the Control Panel:
 In the *Smoothing Groups* panel:
 Press **Select**.
 Press **1**.
 The faces and vertices within the side of the cylinder are selected.
 In the *Smoothing Groups* panel:
 Press **2**.
 The elements in the two caps are selected (and the faces in the side of the cylinder are deselected).
 When button **3** is pressed, no elements in the cylinder are selected since the cylinder contains only two smoothing groups.

Delete the cylinder.

Create a cube 4 units in each direction.

The cube contains 3 smoothing groups (this can be seen from the colour coding in the 3D viewport).

Select each group by pressing **Select** then the **1**, **2** and **3** buttons in the *Smoothing Groups* panel.

Delete the cube from the model.

Create a sphere.

A sphere contains only a single smoothing group (it appears as a single colour).

Uncheck **Colored Smoothing Groups** from the 3D viewport's pop-up menu.

Activity 8.14

Start a new Milkshape project.
 In the 3D viewport, select **Colored Smoothing Groups** from the pop-up menu.
 Add a cylinder.
 Add a box.
 Add a sphere.

There are three different smoothing groups (we can see the three different colours in the 3D viewport).

The sphere's surface shows a single colour so it has only one smoothing group.

Activity 8.15

Start a new Milkshape project.
 Create a cube 6 units in each direction.
 In the *Groups* page of the Control Panel:
 In the *Smoothing Groups* panel:
 Ensure *Auto Smooth* is checked.
 Press **Clear All**.
 In the 3D viewport:
 Ensure the **Smooth Shading** option is selected and that
Colored Smoothing Groups is deselected.
 The cube shows unrealistic shading particularly
 on the corners of the cube.

Activity 8.16

Using the previous model...
 In the *Tools* panel of the *Model* page, press the **Select** button and make sure *Ignore Backfaces* is unchecked.
 In the *Front* viewport select the visible faces (front and back).
 In the *Groups* page of the Control Panel:
 Press **Assign** in the *Smoothing Groups* panel.
 Press **2**.
 In the *Left* viewport select the visible faces (front and back).
 In the *Groups* page of the Control Panel:
 Press **Assign** in the *Smoothing Groups*

panel.
Press **3**.

There are now three smoothing groups in the cube. We can check this using the **Colored Smoothing Groups** from the 3D viewport's pop-up menu.

Activity 8.17

Load *Fin.ms3d*.

Shading on the fin looks unrealistic where the curved surface meets the flat side of the new faces we added.

There is only one smoothing group in the model.

Activity 8.18

Load *Fin.ms3d*.

Select **Tools|Selection Editor**.

In the dialog box:

Ensure the *Shaded* and *Model Outline* icons are pressed.

Press the *Rotate* icon and move the faces of the longest flat surface into view.

Click on the *Select* icon and the *Face Selector Mode* icon.

Click on the first face on the flat surface.

Hold down the *Shift* key and click on the remaining faces of the flat surface.

Press the **Save** button.

In the *Groups* page of the Control Panel:

In the *Smoothing Groups* panel:

Ensure *Auto Smooth* is selected.

Press **Assign**.

Press **2**.

Select **Tools|Selection Editor**.

In the dialog box:

Press the *Rotate* icon and move the faces of the shortest flat surface into view.

Click on the *Select* icon and the *Face Selector Mode* icon.

Click on the first face on the flat surface.

Hold down the *Shift* key and click on the remaining faces of the flat surface.

Press the **Save** button.

In the *Groups* page of the Control Panel:

In the *Smoothing Groups* panel:

Ensure *Auto Smooth* is selected.

Press **Assign**.

Press **3**.

With the two flat surfaces being allocated their own smoothing groups, the model now displays realistic shading on its surface.

Resave the model.

Activity 8.19

Load *Extrude01.ms3d*.

In the 3D viewport, select **Colored Smoothing Groups** from the pop-up menu.

In the *Model* page, click **Select**.

In the *Select Options* panel:

Click **Face**.

Ensure *Ignore Backfaces* is unchecked.

From the *Front* viewport, select all the polygons facing outward (the corresponding polygons at the back of the model will also be selected).

Select the *Groups* page in the Control Panel.

Assign the selected faces to smoothing group 1.

Have a look at the model in the 3D viewport. The front and back surfaces should be yellow, the top and bottom should be cyan, and the two end faces should be magenta.

If this is not yet the case, then perform the following additional instructions:

Select the forward facing polygons from the *Top* viewport.

Assign these faces to smoothing group 2.

Select the front and back ends of the model from the *Left* viewport.

Assign these faces to smoothing group 3.

Switch off **Colored Smoothing Groups** in the 3D viewport and check the updated shading effects shown on your model.

Save the model.

Activity 8.20

Start a new Milkshape project.

Create a 1x4 closed cylinder 6 units high and 1 unit in diameter.

The shading on the side corners of the object does not look realistic.

Select **Colored Smoothing Groups** from the 3D view's pop-up menu.

The object uses 2 smoothing groups: one for all four long sides, another for the smaller ends.

In the *Front* viewport, select the polygons of the forward-facing side and the opposite back-facing side.

In the *Groups* page of the Control Panel, assign these to smoothing group 3.

The object now uses 3 smoothing groups.

Switch off **Colored Smoothing Groups**.

The object now has the correct shading.