Mad About Mirrors

1 Title Sequence

1.1		Title: "Mad About Mirrors". Hold on title at angle for 2 seconds		00:00:00
		hold	2.0	
		Total	2.0	
1.2		The title flies around in a large circle, eventually centering.		00:02:00
		swirl	6.0	
		hold	0.5	
		center	2.0	
		hold	3.0	
		Total	11.5	
1.3		Fade to empty plane.		00:13:15
		fade to plane	1.0	
		Total	1.0	

2 Playing With One Mirror

Triangle and Mirror Arrive

2.1	For today's introduction to mirrors and symmetry, we need a demonstrator. Luckily, a famous Flatlander has volunteered. We also need a mirror.	Hold on empty plane; the triangle arrives. empty plane arrival hold zoom Total	 3.0 4.0 0.5 1.0 8.5	00:14:15
2.2	Hi, my name is Dexter Triangle.	Hold on triangle. hold Total	 3.0 3.0	00:23:00
2.3		First mirror arrives. It is not completely reflective, so a faint pink color can be seen. arrival hold camera motion Total	 2.0 0.5 1.0 3.5	00:26:00

Mirror Tilts

3.1	Watch what happens as the mirror tilts backward and forward.	Hold on newly arrived mirror. narration Total	 4.0 4.0	00:29:15
3.2		Mirror tilts backward. tilt Total	 3.0 3.0	00:33:15
3.3	My reflection tilts when the mirror does, says T.	 hold Total	 2.0 2.0	00:36:15
3.4		Mirror tilts forward, scene holds. tilt hold Total	 6.0 2.0 8.0	00:38:15
3.5		Mirror returns to vertical, perpendicular to plane. tilt Total	 3.0 3.0	00:46:15

3 Playing With Two Mirrors

Second Mirror Arrives

4.1	When we add another mirror, things get considerably more interesting.	Hold on upright mirror. narration Total	 4.0 4.0	00:49:15
4.2		Camera pulls to the side. Hold on side view. Camera motion hold Total	 3.0 1.0 4.0	00:53:15
4.3		Second mirror descends from above. It's faintly blue in color. Appropriate sound effect. arrival Total	 4.0 4.0	00:57:15

Tilting Corridor

5.1	Again, we can tilt the mirror backward and forward, but this time, we see much more.	Hold on side view. narration Total	 5.0 5.0	01:01:15
5.2		Camera moves to corridor to face the first mirror, then the action pauses. camera motion pause Total	 3.0 1.5 4.5	01:06:15
5.3		The first mirror tilts backward slightly, and we see the "barbershop corridor" seem to curve downward. The action pauses, so the viewer can see what's happened. Perhaps a sound that decreases in pitch should go here. tilt pause Total	 2.0 1.0 3.0	01:11:00
5.4		The mirror reverses direction, ending up tilting forward. Perhaps a sound increasing in pitch, then decreasing. The action pauses. tilt pause Total	 4.0 1.0 5.0	01:14:00
5.5		The mirror returns to vertical. Pitch increasing sound. motion Total	 2.0 2.0	01:19:00

Dihedral Symmetry — 90°

6.1	By lining up two mirrors edge to edge, we can see what is called dihedral symmetry.	Hold on the corridor.		01:21:00
		narration	6.0	
		Total	6.0	
6.2		Camera moves to a diagonal view, and the action pauses for a moment.		01:27:00
		motion	2.0	
		hold	0.5	
		Total	2.5	
6.3		Blue mirror moves to align with pink mirror at ninety degree angle. Text "90°" appears in view, and the scene holds.		01:29:15
		motion	2.0	
		text and hold	2.0	
		Total	4.0	
6.4	There are four of me, and two are mirror reversed, says T. What happens when the angle changes?	Text disappears, camera moves closer to see the interior, and stays there for a moment.		01:33:15
		motion	3.0	
		hold	2.0	
		Total	5.0	

Dihedral Symmetry — 45°

7.1		Camera retreats again, and action briefly pauses.		01:38:15
		camera	2.0	
		pause	0.5	
		Total	2.5	
7.2		Blue mirror moves to align with pink mirror at forty-five degree angle. Text "45°" appears in view, and the scene holds.		01:41:00
		motion	2.0	
		text and hold	2.0	
		Total	4.0	
7.3	Now there are eight of me, and four of them are backwards.	Text disappears, camera moves closer to see the interior. When the triangle has completed its motion, the triangle comes into view, if it's not already. This view pauses.		01:45:00
		camera motion	2.0	
		hold	2.0	
		Total	4.0	

Dihedral Symmetry — 60°

8.1		Camera moves back, and there is a brief pause.		01:49:00
		camera	2.0	
		hold	0.5	
		Total	2.5	
8.2		The blue mirror moves to a sixty degree angle, and the text "60°" appears. There is a pause.		01:51:15
		motion	2.0	
		text and hold	2.0	
		Total	4.0	
8.3		The text disappears, the camera moves in, and there is a brief pause before narration of the next act.		01:55:15
		motion	2.0	
		pause	0.5	
		Total	2.5	

4 Three Vertical Mirrors

Third Mirror Arrives

9.1	When we add a third mirror, we can see reflections extending across the entire plane.	Camera holds on sixty-degree kaleidoscope.		01:58:00
		narration	6.0	
		Total	6.0	
9.2		Camera pulls away from mirrors, then turns 180°; the rotation may involve moving the interest.		02:04:00
		translation	2.0	
		rotation	2.0	
		Total	4.0	
9.3		The third mirror arrives. It is faintly yellow or green. There is now a 60-60-60 triangle of mirrors. Angle labels appear at the corners, and this view is paused.		02:08:00
		arrival	2.0	
		text and hold	4.0	
		Total	6.0	

The 60°–60°–60° Triangle of Mirrors

10.1		The camera moves into the kaleidoscope, and tilts up to show ceiling, then looks around. The triangle may have to move.		02:14:00
		camera	2.0	
		initial motion	1.0	
		Total	3.0	
10.2	Wow! My images go on forever, exclaims T.	The camera pans through 360°, then briefly pauses.		02:17:00
		pan	19.0	
		hold	1.0	
		Total	20.0	

45°–45°–90° Triangle of Mirrors

11.1	We can do this for different mirror arrangements, as well.	Camera pulls away again. Hold on view for duration of narration.		02:37:00
		camera	2.0	
		narration	4.0	
		Total	6.0	
11.2		Mirrors transform to 45°–45°–90° triangle; text appears, labelling angles, and there is a pause.		02:43:00
		transformation	2.0	
		text and hold	4.0	
		Total	6.0	
11.3		The text disappears, and the camera moves into the kaledioscope. The triangle may have to move.		02:49:00
		camera motion	2.0	
		hold	0.5	
		Total	2.5	
11.4		The camera pans through 360°, then briefly pauses.		02:51:15
		pan	20.0	
		pause	1.0	
		Total	21.0	

5 Polyhedral Kaleidoscopes

Transition

12.1	You've just seen how kaleidoscopes work. They're made of mirrors that reflect the same image many times. You've also seen that tilting a mirror causes the image in it to tilt as well. Now, watch what happens when these two ideas are combined.	Continue to hold on the inside of the 45°–45°–90° kaleidoscope. The image should go as far as the eye can see, so the reflectivity should be turned way up.		03:12:15
		Narration	15.0	
		Total	15.0	
12.2		The camera moves up, and perhaps slightly sideways.		03:27:15
		translation	1.5	
		pause	0.5	
		Total	2.0	
12.3		The mirrors transform to cubic symmetry		03:29:15
		transformation	2.5	
		pause	0.5	
		Total	3.0	

Cubic Kaleidoscope

13.1	The kaleidoscope's mirrors are arranged along the planes of symmetry of a cube. The chamber itself is 1/48 of a cube. Watch as part of the kaleidoscope moves through the plane with the triangle.	Fade to identical scene, but with kaleidoscope mirrors clipped for a neater look. [Note – no hole in the bottom] There is a brief pause. fade narrate Total	 1.0 14.0 15.0	03:32:15
13.2	Can you see a three dimensional figure in the reflections?	The kaleidoscope translates downward to pierce the plane in such a way that we see triangle man on the faces of a cube. The camera moves to get the best view of the interior image. Pause, to let the cube be recognized, and to narrate. translation camera motion narration and hold Total	 1.0 1.5 4.0 6.5	03:47:15
13.3	As the the kaleidoscope rotates, we can see different shapes.	Hold on cube view. narration Total	 5.0 5.0	03:54:00
13.4		Rotate the plane with the triangle, or rotate the kaleidoscope itself, to show the "cube" become an octahedron. Pause. motion hold Total	 3.0 1.0 4.0	03:59:00

Tetrahedral Kaleidoscope

14.1	Different arrangements of mirrors give even more shapes.	Hold on view of octahedron.		04:03:00
		narration	4.0	
		Total	4.0	
14.2		Camera retreats. Kaleidoscope retreats. Brief Pause		04:07:00
		Camera	2.0	
		Kaleidoscope	2.0	
		hold	0.5	
		Total	4.5	
14.3		Fade or transform to tetrahedral kaleidoscope. Kaleidoscope pierces plane and camera moves in to show image of tetrahedron.		04:11:15
		fade	2.0	
		hold	1.0	
		kaleidoscope and camera motion	4.0	
		hold	2.0	
		Total	9.0	
14.4		Rotation of something to show various shapes. End on tetrahedron, not too large.		04:20:15
		rotation	8.0	
		Total	8.0	

6 Four Mirrors and a Tiling

Tiling space with tetrahedral kaleidoscope

15.1	You can recreate the symmetries that you've seen here so far with a few mirrors or with a computer program such as Jeff Weeks' Kaleidotile. Here, however, is an arrangement that might give you some trouble if you were to try it in real life.	Music swells (A fragment of Bach's Toccata & Fugue in D minor would be nice). Hold on tetrahedral kaleidoscope.		04:28:15
		narration	10.0	
		Total	10.0	
15.2		Music continues. Camera moves to face opening. It is within the confines of the kaleidoscope. A fourth mirror comes into view and hangs above for a moment.		04:38:15
		camera	2.0	
		mirror arrives	2.0	
		hold	2.0	
		Total	6.0	
15.3		At a time appropriate to some climactic music, the mirror swoops in to complete the tiling of space. Pan majestically around, until the music ends, or gets to a good place. Tentatively 15 seconds. Fade out during pan.		04:44:15
		pan	15.0	
		fade	2.0	
		Total	17.0	
15.4		Credits:		05:01:15
		Narration, Music, Tech	5.0	
		Teacher Team, Arnie, Feedback	8.0	
		SOFTIMAGE	5.0	
		KaleidoTile	8.0	
		Geometry Center	8.0	
		Total	34.0	