### Use of

Information Technology

Exemplar 12

Exemplar	Fun with Rotation		
Objectives :	<ul><li>(1) To investigate the effect of rotation on simple shapes</li><li>(2) To discover the centre of rotation</li></ul>		
Dimension :	Measures, Shape and Space		
Learning Unit :	Transformation and Symmetry, Introduction to Coordinates		
Key Stage :	3		
Material Required :	Internet		
Prerequisite Knowledge :	(1) Common terms and notations in geometry such as points, line segments, etc		
	(2) Rectangular coordinate system		

## **Description of the Activity :**

- 1. The teacher distributes Worksheet 12.1 to students.
- 2. The web site "MathsNet" is introduced to students.
- 3. The teacher explains how to choose a question in the Colour Grid.
- 4. Students are asked to do some of the problems in the class and some at home, for example, questions (a) to (n) in the class and questions (o) to (q) at home.
- 5. The teacher checks and discusses the answers with students.
- 6. Other web sites are introduced for students' self-learning.

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# Worksheet 12.1: Fun with Rotation

You will use the dynamic geometry programme in the web site of "MathsNet" to complete this worksheet. Use the mouse to change or move the diagrams so as to see the changes on the points, lines and shapes.

- 1. Connect to the Internet and enter the web site <u>http://www.mathsnet.net/</u>.
- 2. Choose "Rotations" from the pull-down menu (See Figure 12.1).

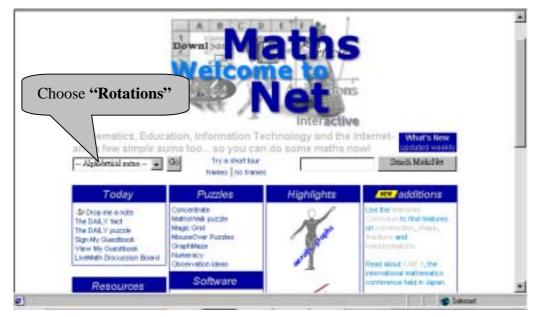


Figure 12.1



3. A new window will open and you can see a brief introduction of the program (see Figure 12.2).

	Maths Curriculum materials for students, schools and colleges create by MathsNet in partnership with AnglisCampus.	f Inte Tech	Colour
	Retation Flash Introduction The aim of these interactive materials is simple, to provide you with a clear and complete understanding of what rotations are, what they do and the effect they have on simple shapes. You will do this using dynamic geometry. You will be able to change the diagrams yourself using the mouse and see the effect these changes have on points, lines and shapes. To work through this unit, use the coloured grid. Moving down the grid changes the topic to something a little harder, moving left or right changes a small aspect of the topic. If shows where you are. Please note that the very first topic you choose may take a little time to load, but al later topics will load much more quickly. Please be patient! See the Tech page for more details about this.		Grid
	Related topics such as reflections, translations or enlargements, are evailable on AngliaCampus.		
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Figure 12.2

- 4. On the right-hand-side of the screen, you can see a colour grid. Moving left or right changes a question, moving down the grid changes the question to a harder level. X shows where you are.
- 5. Move the pointer to any box inside the colour grid, the Question Number will appear beside the pointer.
- 6. Try the following problems and write your answers in the spaces provided.
  - (a) Question **a3** : Which of these is true?

(b) Question **b1** : In how many different positions does it cover itself exactly?

Hexagon : \_\_\_\_\_\_
Triangle : \_\_\_\_\_
Rectangle : \_\_\_\_\_

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Internet (c)	Question <b>b</b> 2 :	Which of these is true?
(0)	Question 03.	which of these is true?
(d)	Question <b>b4</b> :	What do the four lines through the centre of rotation show?
(e)	Question <b>c1</b> :	Use your mouse to move the points and find the 4 sets.
		1 <sup>st</sup> set : 2 <sup>nd</sup> set :
		3 <sup>rd</sup> set : 4 <sup>th</sup> set :
(f)	Question c3 :	What property do these lines always have?
(g)	Question c4 :	Which shapes show a quarter turn of the yellow shape?
		Which shapes show a half turn?
(h)	Question <b>d0</b> :	Which one of the labelled points is the centre of the rotation?
(i)	Question <b>d4</b> :	What are the coordinates of this new position?
		Try other starting positions for the red point. What happens?
		What happens if you make the angle of rotation 180°?
(j)	Question e0:	Is it possible to alter the yellow shape or rotate the blue shape so that the areas are different?
(k)	Question e1:	Is it possible to alter the yellow shape or rotate the blue shape so that the angles do not match?
(k)	Question e1:	

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(1)	Question <b>e2</b> :	<i>Exemplar 12</i> Is it possible to alter the yellow shape or rotate the blue shape so that the lengths of sides do not match?
(m)	Question <b>f0</b> :	What do you notice about those perpendicular bisectors?
(n)	Question <b>f1</b> :	What do you notice about those perpendicular bisectors?
	allenging probl te down briefly	ems : the correct steps in sequence.
(0)	Question <b>f2</b> :	Steps
(p)	(p) Question <b>f3</b> : Ste	Steps
(q)	Question <b>f4</b> :	Steps

#### Internet

## Notes for Teachers :

- 1. Before completing this worksheet, students should have some concepts of rotation on simple figures.
- 2. Only some of the questions from this web site are included in this worksheet. The teacher can modify the activity by adding some more questions from the Colour Grid.
- 3. If students are familiar with this topic and the equipment is sufficient, the teacher can let students complete this worksheet during the lesson. The teacher may adjust the number of questions as appropriate.
- 4. If the teacher would like to know the answers, they can send e-mail to the "MathsNet" to make request for it.
- 5. Some useful web sites for activities of transformation :
  - (a) <u>http://www.utc.edu/~cpmawata/transformations/translations/</u>
     (To build up the concepts of transformations, with Java applets and guided questions)
  - (b) <u>http://www.schools.ash.org.au/stkierans-manly/Classes/Yr6/6B/Symmetry</u> /index.htm

(To explore the concepts of the line symmetry and rotational symmetry in the world around us, with many beautiful pictures)

- (c) <u>http://www.shodor.org/interactivate/activities/transform/index.html</u>
   (To explore the transformations of squares, parallelograms and triangles in the rectangular co-ordinate plane, with Java applets)
- 6. Some of the web sites mentioned in this exemplar may cease to exist or be relocated as time goes. The teacher should check and make sure that the web sites still exist before the activity.