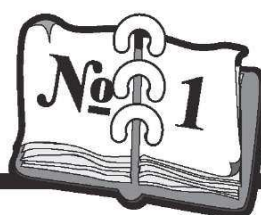


## *Visual notes*

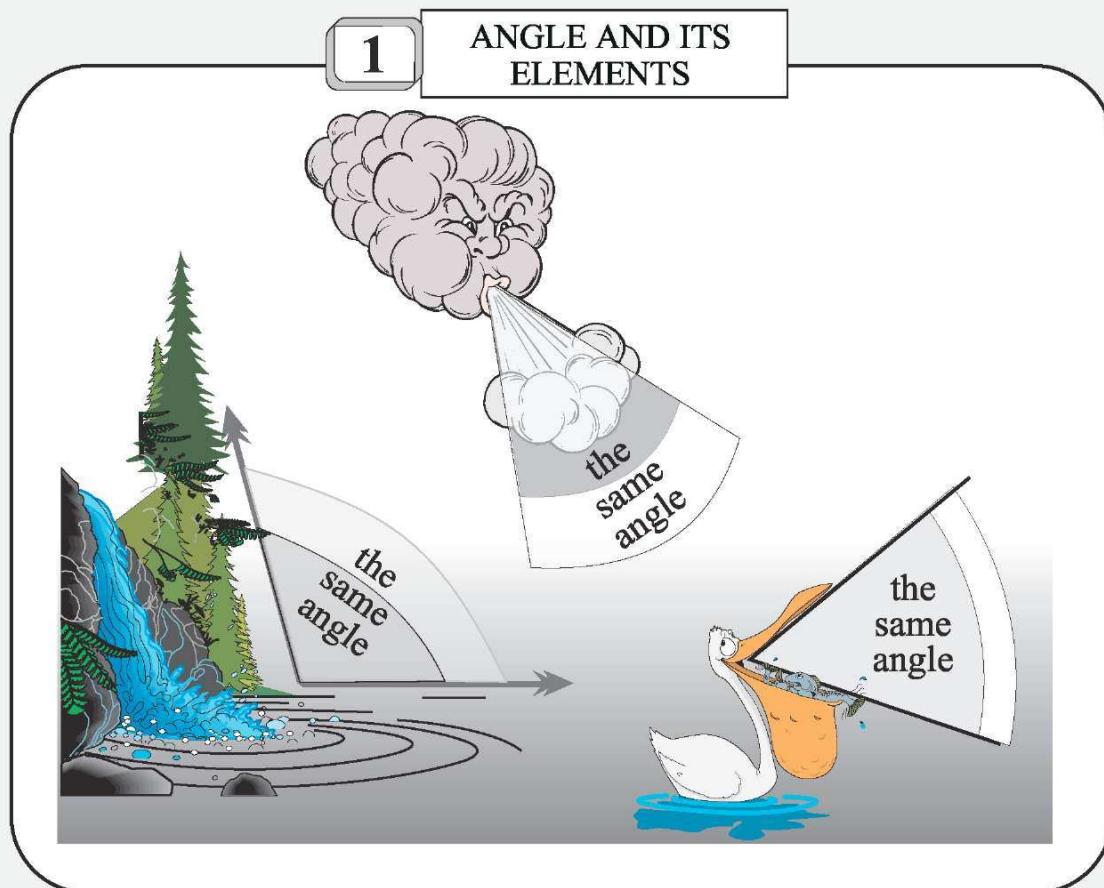


# *Angular measurements*

1. Angle and its elements . . . . .	2
2. Degree measure of an angle . . . . .	4
3. Zero, right and straight angles . . . . .	6
4. Angles' measuring device . . . . .	8
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6. Angular comparisions . . . . .	12
7. Acute and obtuse angles . . . . .	14
8. Marking of angles by Greek letters . . . . .	16
9. Marking of angles, their vertices and sides . . . . .	18
10. Complete and convex angles . . . . .	20
Information diagram «Angles» . . . . .	22
Different problems . . . . .	24

1

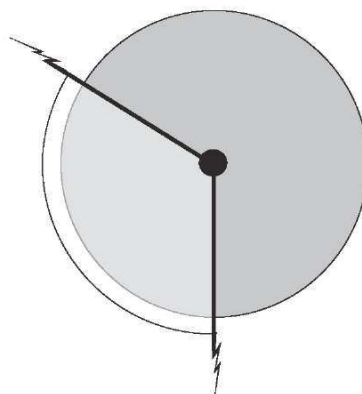
## ANGLE AND ITS ELEMENTS



## LOOK AND FIND

1

how many angles  
two rays leaving one  
vertex make



**2 LOOK AND FIND**

(tint)  
the angle with  
the preset sides

**3 LOOK AND FIND 4**

(tint)  
the second angle  
with the preset sides

**LOOK AND FIND 5**

the number of the  
tinted angles

the total number  
of the angles

**5 LOOK AND FIND**

**LOOK AND FIND 7**

(tint)  
another angle,  
made by these rays

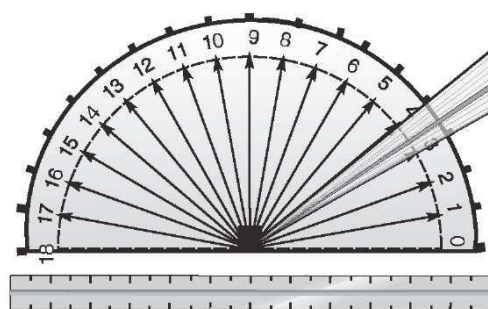
**2**

## DEGREE MEASURE OF AN ANGLE

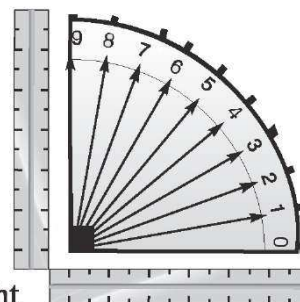
A semicircle is  
divided into  
**18** equal portions

Then each of them  
is divided into  
**10** equal portions

We get a unit of  
the angle  
measurement –  
**1 degree**



Straight angle



Right  
angle

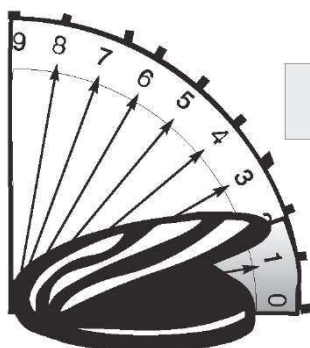
**1**

## LOOK AND FIND

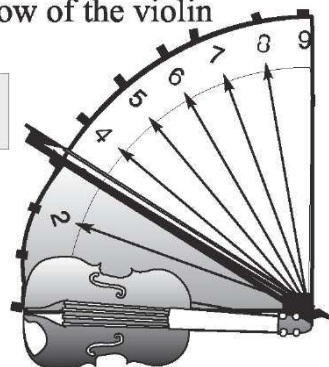
**2**

the degree measure of the angle

between the halves  
of the shell

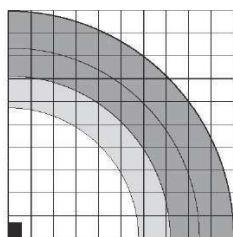


between  
the strings and  
the bow of the violin

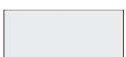
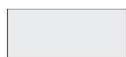


**LOOK  
AND FIND**

**3**



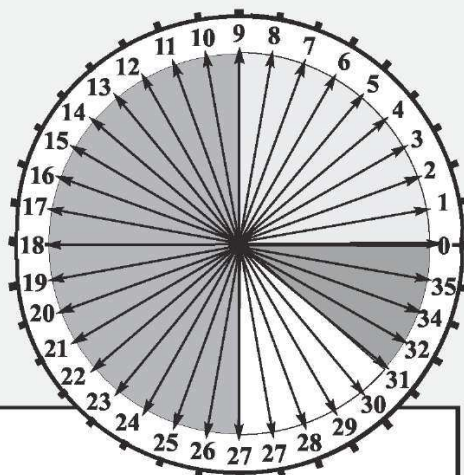
the number of  
the drawn angles



the degree  
measure of  
the angle

**LOOK  
AND FIND**

**4**



**Test 5**

Determine  
how many  
degrees  
are in

360 315 270 225 180 135 90 45 27,5

a circle

a semicircle

the eighth portion of a circle

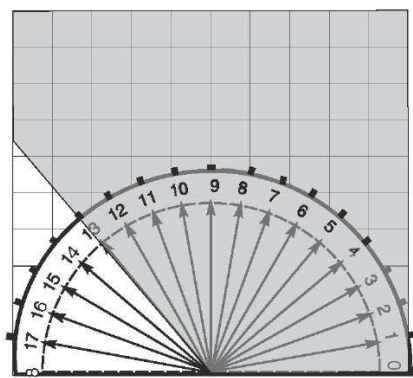
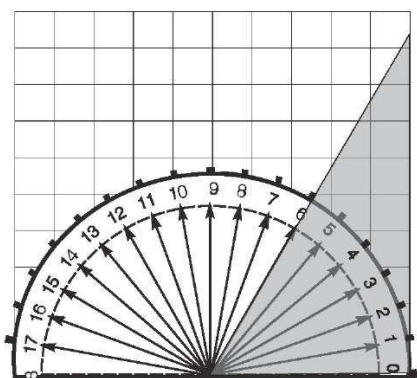
a quarter of a circle


**6**

**LOOK  
AND FIND**

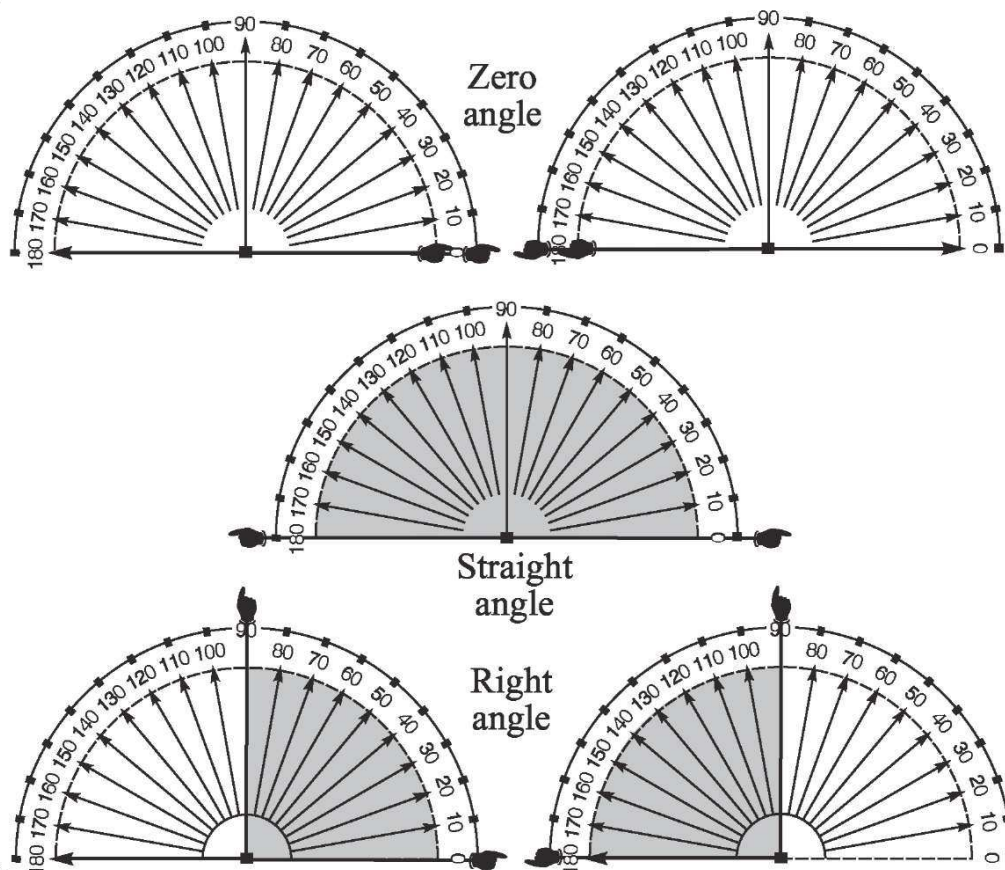
**7**

the degree measure of the tinted angle



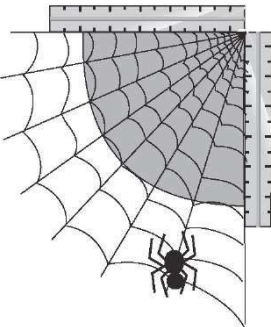
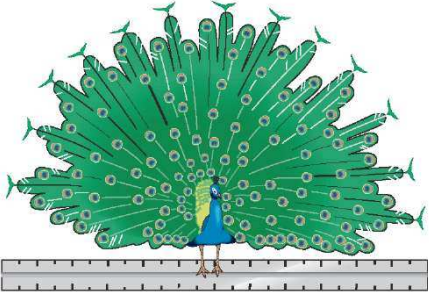
**3**

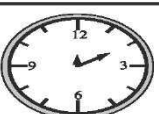




### ZERO, RIGHT AND STRAIGHT ANGLES



1	CHOOSE THE ANSWER		CHOOSE THE ANSWER	2
A right angle contains	A	0 degrees	A	A zero angle contains
	B	10 degrees	B	
	C	90 degrees	C	
	D	180 degrees	D	
	E	360 degrees	E	

Reznik N.A. Visual notes "Angles": Visual materials for teachers and pupils (5-7 forms).  
 /Translated from Russian by V.N. Zykova. - Murmansk, 1997. - 46p. - (Institute of Productive  
 Training of the Russian Academy of Education. Murmansk State Technical University)

<b>3</b>	<b>LOOK AND FIND</b>	<b>4</b>
<p>what angle is made at the «vertex»</p>		
<p>of the web by the spider</p>		<p>of the tail by the peacock</p>
		

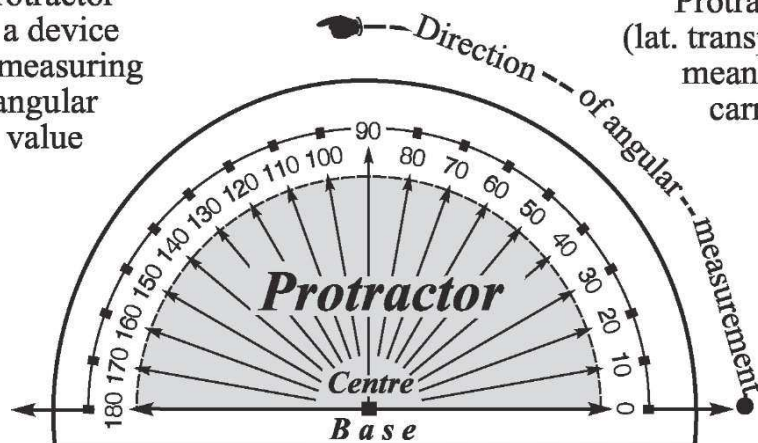
MATRIX 5	The night period of time is shown by the clock. Determine what time will be by the clock if its minute hand			
	circumscribes a full circle	circumscribes a right angle	circumscribes a straight angle	circumscribes a 45 angle
				
				
				
				
				

4

## ANGLES' MEASURING DEVICE

Protractor  
is a device  
for measuring  
angular  
value

Protractor  
(lat. transportare)  
means to  
carry



### EXAMPLE

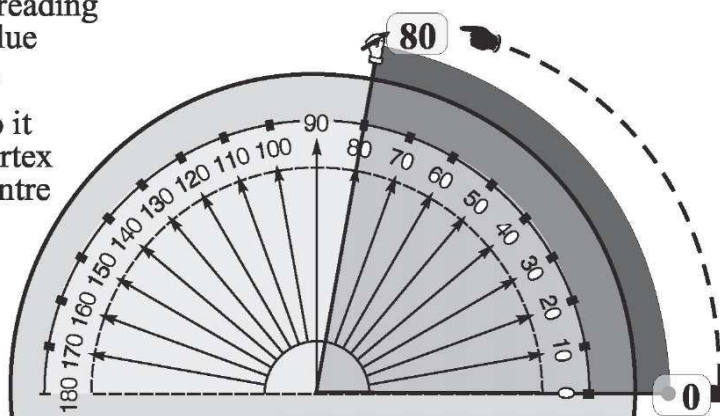
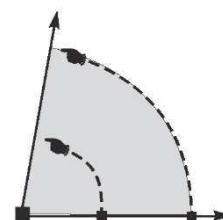
With the help of a protractor  
find the angular value:

Analysis

Solution

Let s'choose  
a ray, from which the reading  
of this angular value  
will be started.

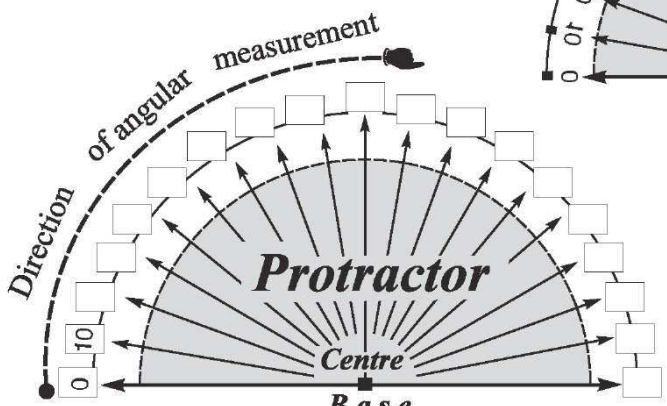
Put the protractor to it  
so that the angular vertex  
coincides with the centre  
of the protractor

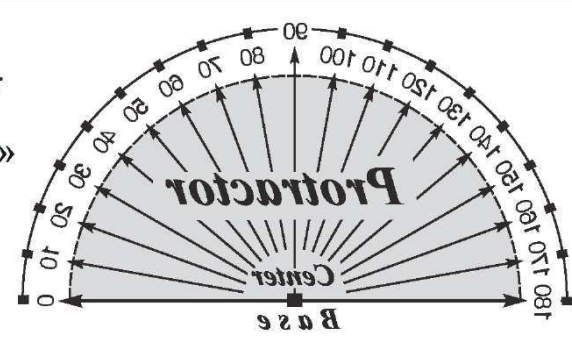


**LOOK  
AND FIND**

**1**

how the  
protractor  
became  
«defective»





(write down)  
the absent  
figures  
in the «repaired»  
protractor

**2**

**LOOK  
AND FIND**

**3**

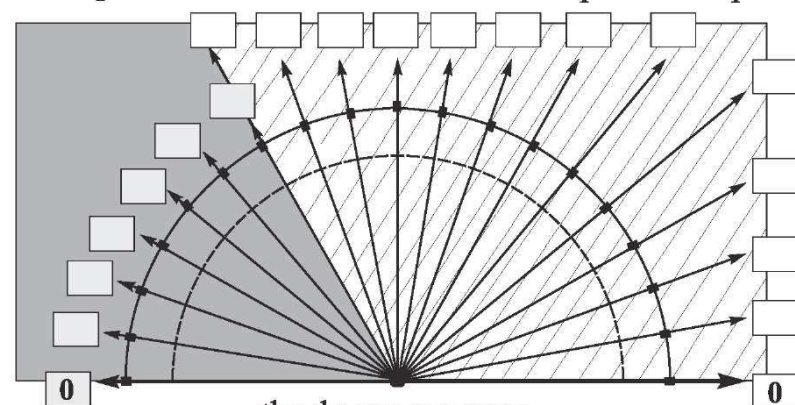
**LOOK  
AND FIND**

**4**

in the tinted  
part of the picture

the absent values

in the crosshatched  
part of the picture



of the tinted  
angle

the degree measure

of the crosshatched  
angle

**5**

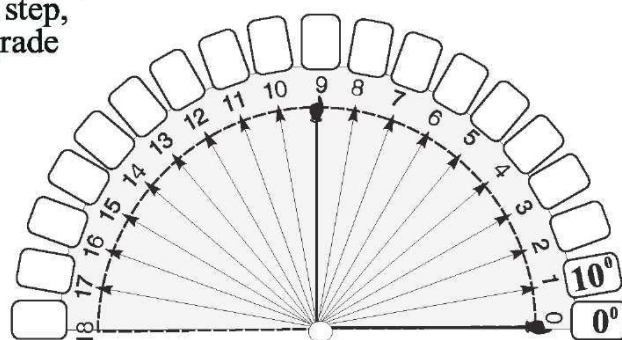
**LOOK  
AND FIND**

**6**

**5**

## ANGULAR MEASUREMENT

Degree  
 (lat. *gradus*)  
 is a step,  
 a grade

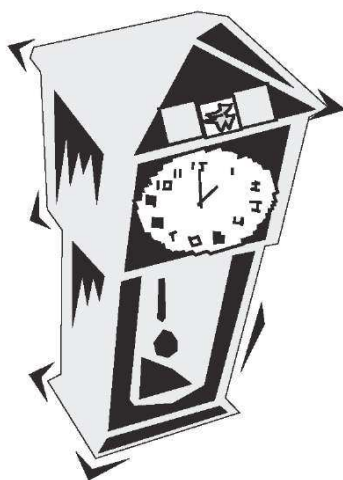


Instead of  
 the word  
 «degree»  
 symbol  
 «°»  
 is put down  
 to the right  
 and  
 above  
 the figures

### EXAMPLE

Determine, how many degrees  
 the angle,  
 made by the clock hands,  
 pointing at the adjacent figures,  
 contains

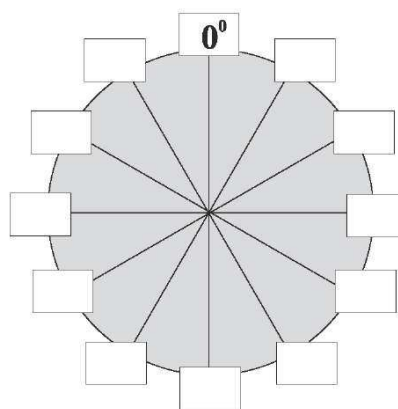
Analysis



A circle  
 of the dial  
 is divided  
 by the figures  
 into  portions

The circle  
 contains  
 degrees

Solution



The required  
 angle is equal to  
 degrees

**LOOK AND FIND**

**1**

how many even numbers are on the clock dial

**2**

what angle the clock hands make, when they point to the figures, which are even numbers

**3**

LOOK AND FIND

a figure with the wrong marking

**LOOK AND FIND**

**4**

angles, degree measure of which is  $90^\circ$

**5**

vertices of right angles

**LOOK AND FIND**

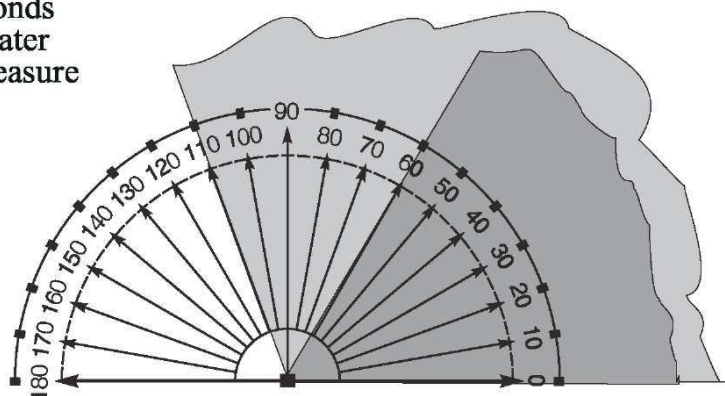
the angular value between two shoulders of the hanger

Test 7	Determine the degree measure of an angle if it is known that this angle makes a portion of a right angle											
	$1^\circ$	$7,5^\circ$	$15^\circ$	$22,5^\circ$	$30^\circ$	$37,5^\circ$	$45^\circ$	$52,5^\circ$	$60^\circ$	$67,5^\circ$	$90^\circ$	$97,5^\circ$
its half												
its quarter												
its third portion												
its twelfth portion												
the two sixth of it												

6

## ANGULAR COMPARISONS

A greater angle  
corresponds  
to a greater  
degree measure



1

### CHOOSE THE ANSWER

The angles are equal,  
if their  
degree measures are

A	180°
B	different
C	arbitrary
D	equal
E	90°

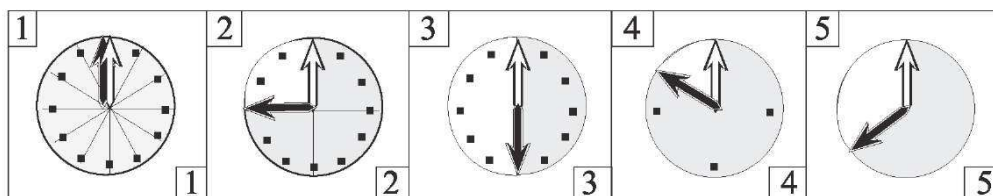
2

### LOOK AND FIND

the clock, the hands  
of which  
make an angle that is greater  
than a right one  
but less  
than a straight one

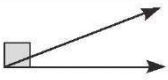
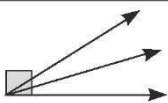
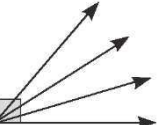
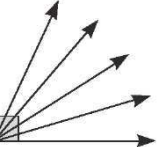
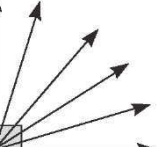
Series 3

Determine the angle which has  
been circumscribed by the white hand, having  
taken the position of the **black** hand



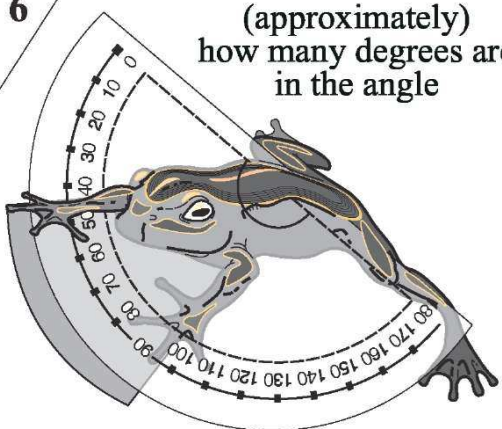
Determine the angle which has  
been circumscribed by the **black** hand, having  
taken the position of the white hand

Серия 4

Test 5 Determine, how many angles less than a right one are drawn																					
in every picture		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
																					
																					
																					
																					
																					

**LOOK  
AND DETERMINE**

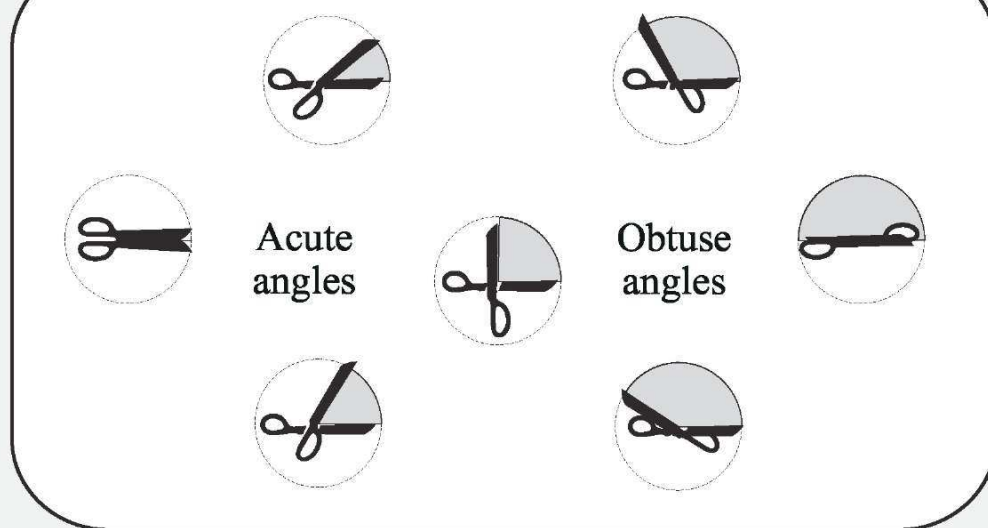
6 (approximately)  
how many degrees are  
in the angle



A	between the front legs of the frog	
B	between the hind legs of the frog	
C	which is the least of the angles between the front leg and the hind leg of the frog	
D	which is the greatest of the angles between the front leg and hind leg of the frog	
E	between the legs of the frog, which is greater than a right angle, but less than a straight one	

7

## ACUTE AND OBTUSE ANGLES



1

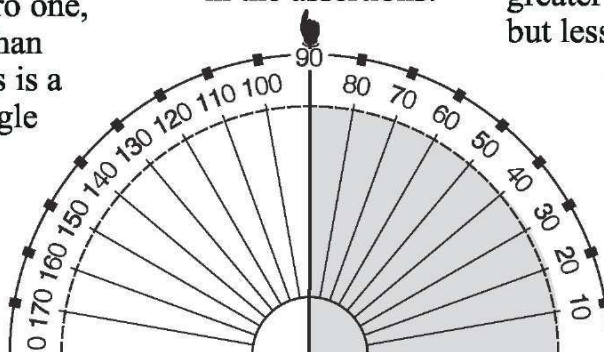
## LOOK AND FIND

2

If an angle is greater than a zero one, but it is less than a right one, this is a  angle

the omitted words in the assertions:

If an angle is greater than  but less than  this is an obtuse angle



the omitted word in the assertion:

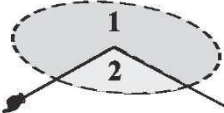
If an angle is less than any angle, this is a  angle

## LOOK AND FIND

3

**LOOK AND FIND**

4




angles  
greater than a right one  
a straight one

6

**LOOK AND FIND**

5

the total number of rays  
making every angle



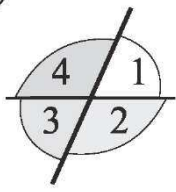
all angles

7

**LOOK AND FIND**

8

angles

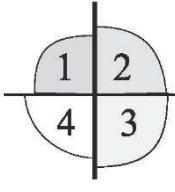


A obtuse  
B acute  
C zero  
D right  
E straight

**LOOK AND FIND**

9

angles

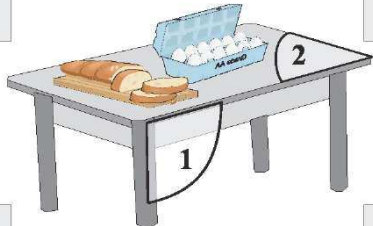


**LOOK AND FIND**

10

the type of the angle  
as we see it  
in the picture

1,



2,

1

the real degree measure  
of the angle

2

12

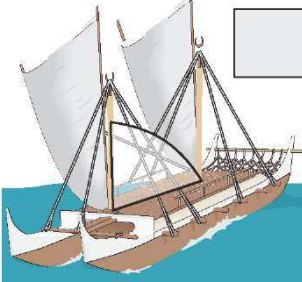
**LOOK AND FIND**

13

**LOOK AND FIND**

14

the type of the marked  
angle in the picture



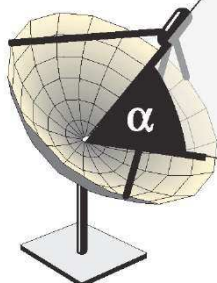
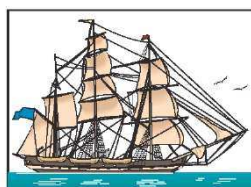
the real degree measure  
of the marked angle  
in the picture

15

**LOOK AND FIND**

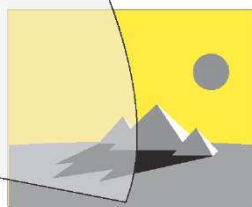
9

## MARKING OF ANGLES BY GREEK LETTERS



An angle  
can be  
marked by one  
Greek letter

$\alpha$  (alpha)  
 $\beta$  (beta)  
 $\gamma$  (gamma)  
 $\delta$  (delta)



1

### CHOOSE THE ANSWER

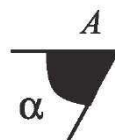
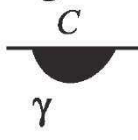
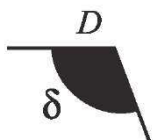
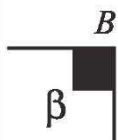
2

The greatest

The least

number of degrees  
is in angle

A	alpha
B	beta
C	gamma
D	delta



$\angle A$	A
$\angle B$	B
$\angle C$	C
$\angle D$	D

3

### LOOK AND FIND

at what  
number  
capital  
letter «delta»  
is placed in the list  
of Greek letters

1	2	3	4
$\alpha$	$\beta$	$\gamma$	$\delta$

### Test 4


The least

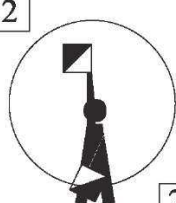
	$x$	$\alpha$	$\beta$	$y$	$\delta$	$\gamma$
alpha						
beta						
delta						
chi						
igrek						

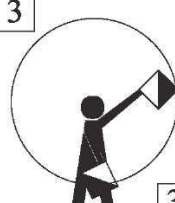
Reznik N.A. Visual notes "Angles": Visual materials for teachers and pupils (5-7 forms).  
 /Translated from Russian by V.N. Zykova. - Murmansk, 1997. - 46p. - (Institute of Productive  
 Training of the Russian Academy of Education. Murmansk State Technical University)

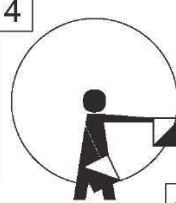
Tint and mark by letter  $\alpha$   
the least angle between the arms of the signalman


5  
S  
i  
m  
u  
l  
a  
t  
o  
r

1  


2  


3  


4  


5  


1

2

3

4

5

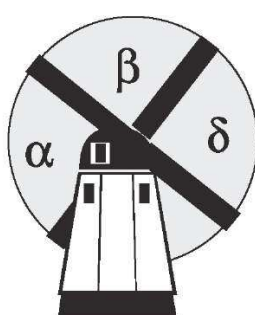
Crosshatch and mark by letter  $\beta$   
the greatest angle between the arms of the signalman

S  
i  
m  
u  
l  
a  
t  
o  
r

6

7  
LOOK  
AND FIND

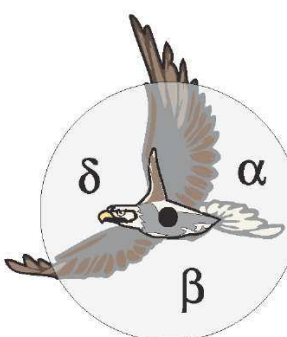
8



$\alpha$   $\beta$   $\delta$

(with the help of a protractor)  
the degree measure of angle  $\delta$

the least of the marked angles



$\delta$   $\alpha$   $\beta$

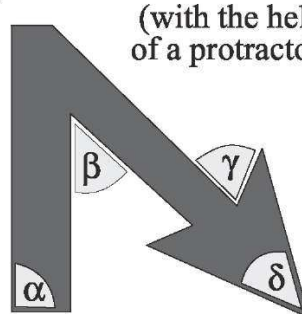
9  
LOOK  
AND FIND

10

11  
LOOK  
AND DETERMINE

11

(with the help of a protractor)

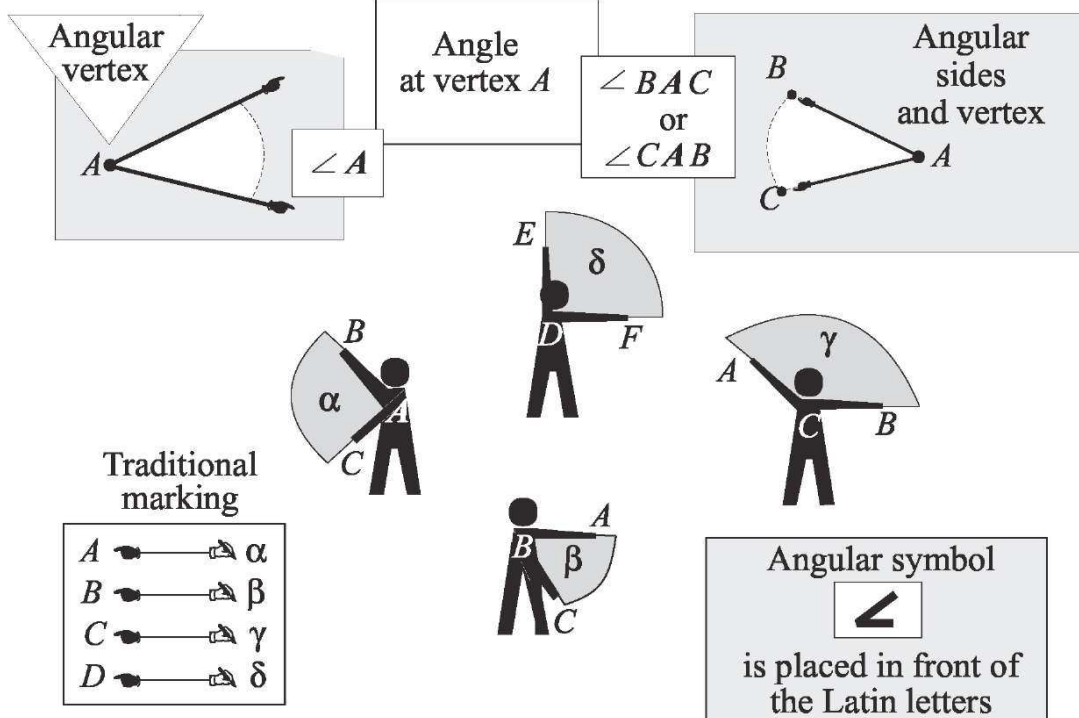


$\alpha$   $\beta$   $\gamma$   $\delta$

A	the value of angle a	
B	how much greater than angle b angle a is	
C	what angle $\beta$ or $\delta$ is greater and how much greater	
D	the sum of degree measures of all the angles	
E	the angle having the least degree measure	

9

## MARKING OF ANGLES, THEIR VERTICES AND SIDES



1

### CHOOSE THE ANSWER

2

The number of Latin letters,  
which can assign

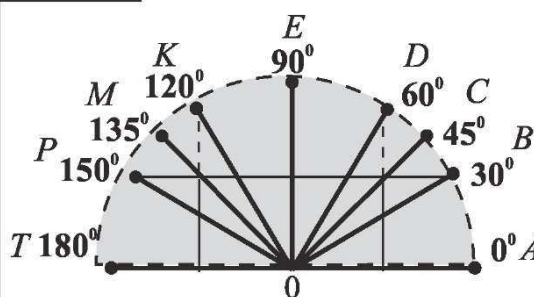
angular  
vertex

angular  
side

0	A
1	B
2	C
3	D

A	0
B	1
C	2
D	3

### Series 3



Find the value of an angle

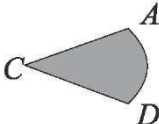
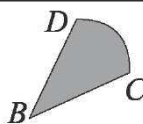
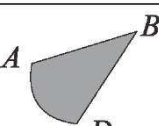
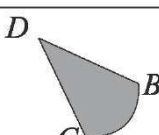
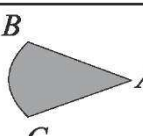
1 AOE

2 AOD

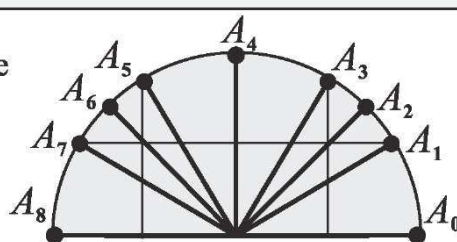
3 EOK

4 DOK

5 KOP

Test 4 Indicate the marking of an											
angle	$ABC$	$ABD$	$ADC$	$ACD$	$CDB$	$BDA$	$BDC$	$BAC$	$DAB$	$DBC$	$CAB$
											
											
											
											
											

Test 5 Determine the angle, which must circumscribe the radius of the circle while moving from the initial position to the final position, if													
Position													
Initial	Final	$15^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$75^\circ$	$90^\circ$	$105^\circ$	$120^\circ$	$135^\circ$	$150^\circ$	$165^\circ$	
$OA_0$	$OA_3$												
$OA_1$	$OA_6$												
$OA_3$	$OA_5$												
$OA_1$	$OA_8$												
$OA_6$	$OA_7$												



10

## COMPLETE AND CONVEX ANGLES



angle



angle

If an angle is greater than a zero one, but less than a straight, this is

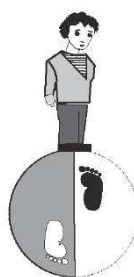
\_\_\_\_\_ or \_\_\_\_\_



angle



angle



angle

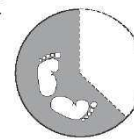
If an angle is greater than \_\_\_\_\_, but less than a complete one, this is a convex angle



Convex angle



Complete angle



1

Stimulator

Determine the types of the angles, which are made by the clock hands, if they point to

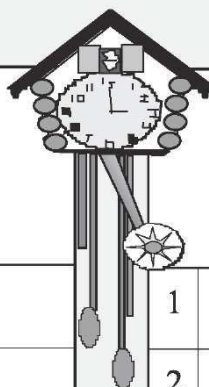
1 12 and 3

2 2 and 6

3 7 and 11

4 12 and 1

5 2 and 10



Determine the types of the angles, which are made by the clock hands

1 at midday

2 at 7 p. m.

3 at half past one

4 at eighteen thirty

5 at five minutes to twelve

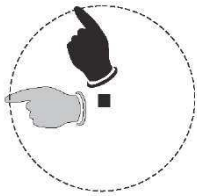
2

Stimulator

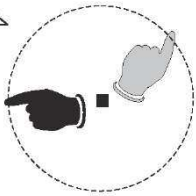
3

LOOK  
AND FIND

4



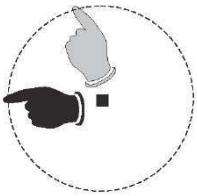
(draw and Crosshatch)  
a *convex* angle  
between the gloves



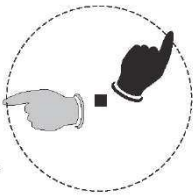
5

LOOK  
AND FIND

6



(draw and Crosshatch)  
an *unconvex* angle  
between  
the gloves  
and determine its type



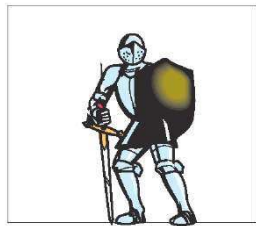
Test 7	Evaluate angle $\alpha$ , if it is known, that						
this angle is	$\alpha = 0^\circ$	$0^\circ < \alpha < 90^\circ$	$\alpha = 90^\circ$	$90^\circ < \alpha < 180^\circ$	$\alpha = 180^\circ$	$180^\circ < \alpha < 360^\circ$	$\alpha = 360^\circ$
complete							
obtuse							
acute							
straight							
convex							

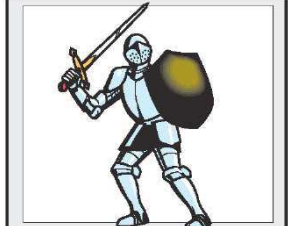
8

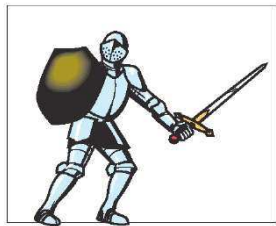
LOOK  
AND FIND

9

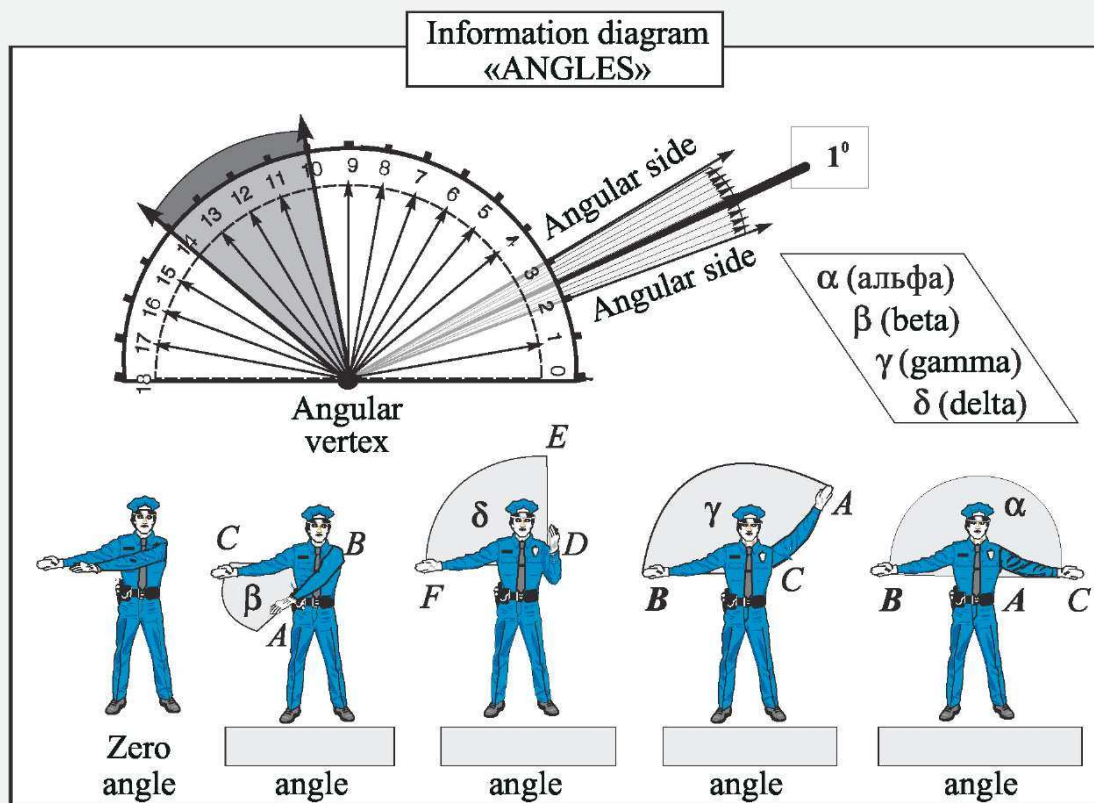
the type of the angle  
made by the knight's sword  
after the artist had turned it









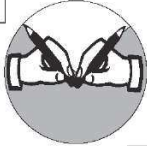
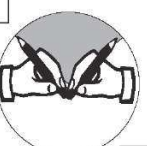
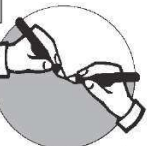
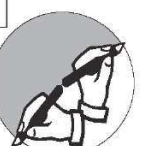


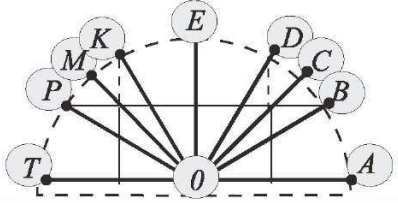







Reznik N.A. Visual notes "Angles": Visual materials for teachers and pupils (5-7 forms).  
 /Translated from Russian by V.N. Zykova. - Murmansk, 1997. - 46p. - (Institute of Productive  
 Training of the Russian Academy of Education. Murmansk State Technical University)

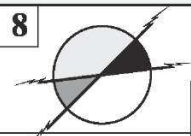


Test 1		Determine						
a type of the angle		Right	Obtuse	Acute	Zero	Straight	Complete	Convex
								
								
								
								
								

<b>2</b>	<b>Determine the type of the untinted angle</b>					<b>Stimulator</b>
<b>Stimulator</b>	1 	2 	3 	4 	5 	<b>Stimulator</b>
	1	2	3	4	5	
	<b>Determine the type of the tinted angle</b>					<b>3</b>

<b>4</b>	<b>Stimulator</b>	<p style="text-align: center;"><b>Determine the degree measure of an angle</b></p> 	<b>Determine the type of an angle</b>	<b>Stimulator</b>										
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; padding: 5px;">1 AOE</td> <td style="width: 20%; padding: 5px;">2 DOC</td> <td style="width: 20%; padding: 5px;">3 TOK</td> <td style="width: 20%; padding: 5px;">4 DOT</td> <td style="width: 20%; padding: 5px;">5 TOB</td> </tr> <tr> <td style="height: 20px;"></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	1 AOE	2 DOC	3 TOK	4 DOT	5 TOB							<b>5</b>
1 AOE	2 DOC	3 TOK	4 DOT	5 TOB										

<p style="text-align: center;"><b>LOOK AND FIND</b></p> <p style="text-align: center;"><b>6</b></p> <p style="text-align: center;">the clock, the hands of which make a convex angle</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">1 </div> <div style="text-align: center;">2 </div> <div style="text-align: center;">3 </div> <div style="text-align: center;">4 </div> <div style="text-align: center;">5 </div> </div>	<p style="text-align: center;">a defective clock</p> <p style="text-align: center;"><b>7</b></p> <p style="text-align: center;"><b>LOOK AND FIND</b></p>
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<b>Test 8</b>		<b>Determine the number of the drawn</b>											
		2	4	6	8	10	12	14	16	18	20	22	24
lines													
raus													
semicircles													
angles													
angular sides													

Reznik N.A. Visual notes "Angles": Visual materials for teachers and pupils (5-7 forms).  
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 Training of the Russian Academy of Education. Murmansk State Technical University)

MATRIX	Show the time, drawing the clock hands, if			
	the hour hand		the minute hand	
ANGLES ON THE CLOCK	a straight angle	a right angle	three quarters of a straight angle	one eighth of a complete angle
