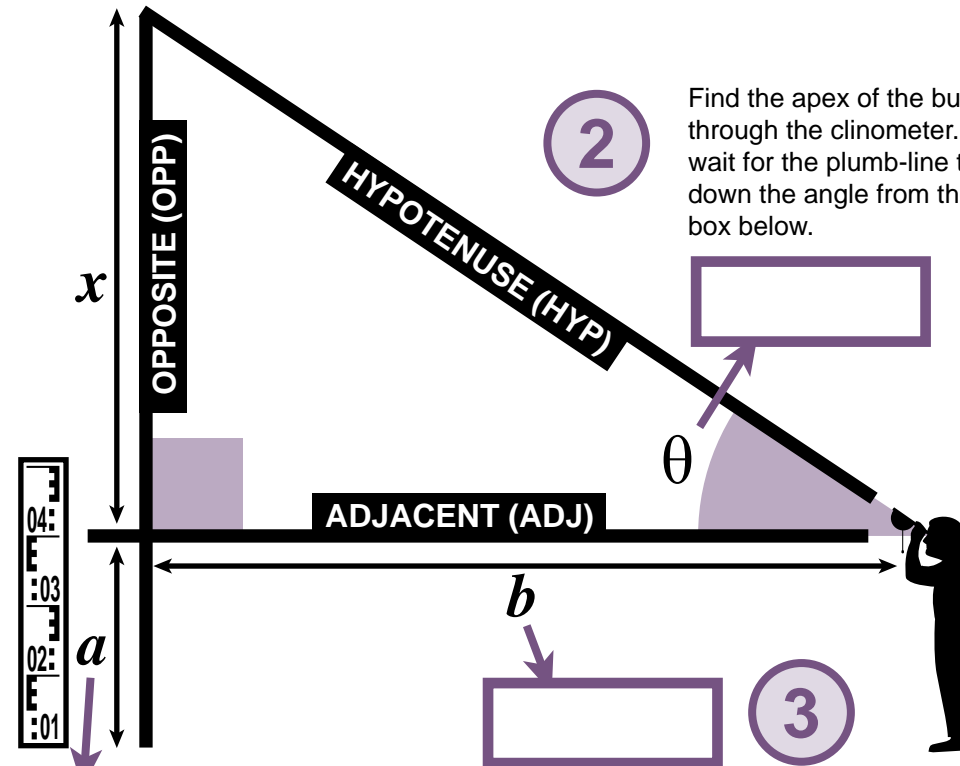


Calculating the height of a building

<http://www.virtualmaths.org/activities/shapes/theod2>

We're going to use a clinometer to find the total height of a building.
First assemble the attached clinometer and continue with this activity.



2

Find the apex of the building by looking through the clinometer. Once you've found it, wait for the plumb-line to settle and note down the angle from the clinometer in the box below.

3

Find an area on the ground directly beneath the plumb-line and mark it with an object, like a coin.
Now measure the distance between the marker and the building, and write the measurement in the box below.

1

Stand as far back as you need to, so you can clearly see the apex of the building.
Look through the clinometer at the leveling staff or measuring tape, **making sure the the angle on the clinometer reads 0**. Now take the reading and write it in the box above.

We know that...

$$\text{Tan } \theta = \frac{\text{OPP}}{\text{ADJ}}$$

We want to work out the height of **OPP**, so we need to make **OPP** the subject of the above equation.

We can do that by multiplying both sides by **ADJ**, which will cancel out the **ADJ** on the right side of the equation.

$$\text{ADJ} \times \text{Tan } \theta = \cancel{\text{ADJ}} \left(\frac{\text{OPP}}{\cancel{\text{ADJ}}} \right)$$

Now we have...

$$\text{OPP} = \text{ADJ} \times \text{Tan } \theta$$

So...

$$x = \text{ADJ} \times \text{Tan } \theta$$

What is **x** ?

.....

To find the height of the building, add **x** to height **a** that you found earlier

height =

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Virtualmaths

www.virtualmaths.org

DIY CLINOMETER



Things you'll need

- Some string
- A coin or similar weight
- Scissors
- Glue
- Adhesive tape

1

Cut along the dashed line and separate the clinometer shape from this template sheet.

2

Carefully punch a hole at the center point of the protractor. Make sure the hole is just large enough to pass your piece of string through - the larger the hole, the less accurate the readings!

3

Now fold along the line that attaches the rectangle shape to the protractor, creating a hinge.

4

Apply some glue to the gray marked area and roll the rectangle to form your scope.

5

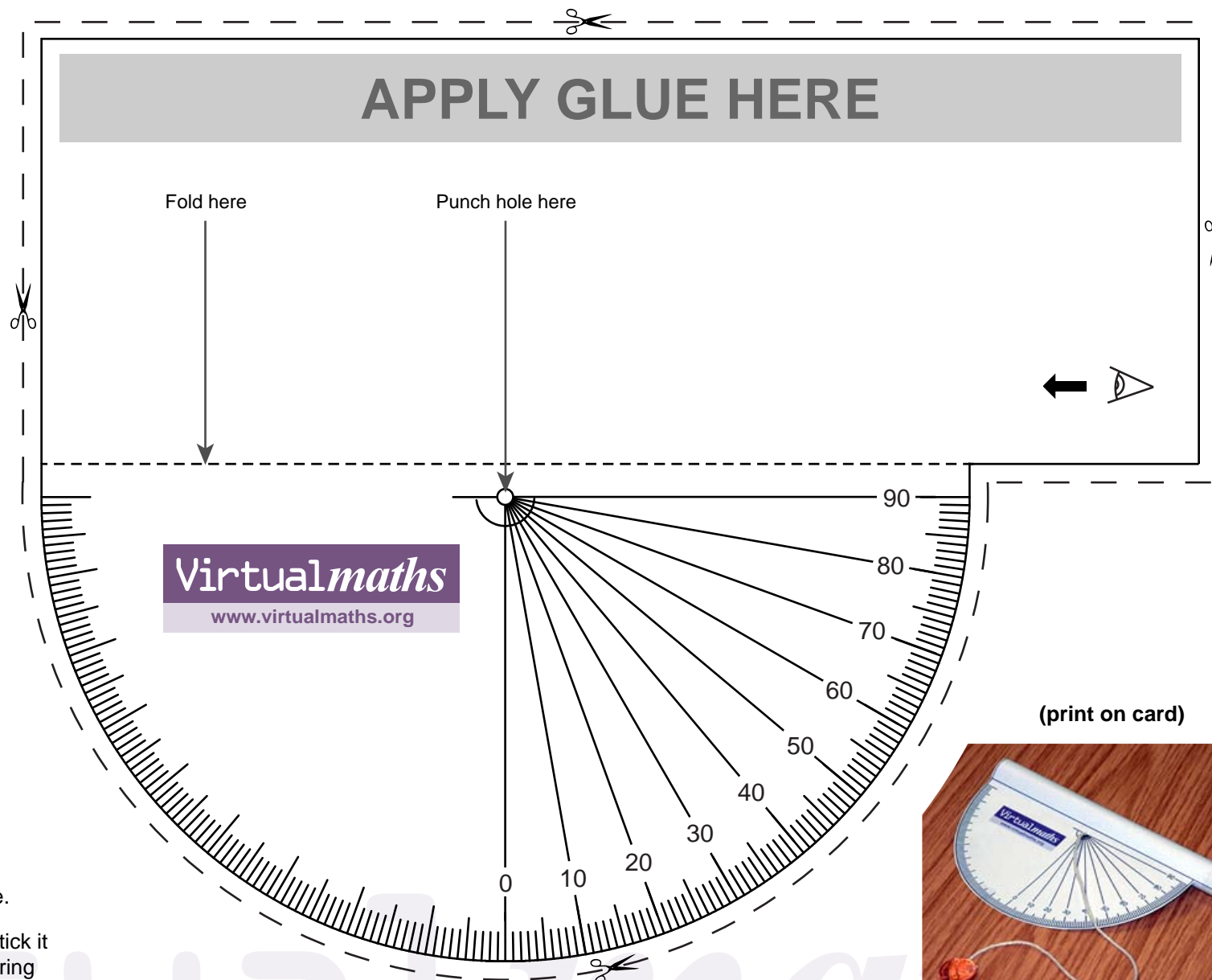
Apply some adhesive tape to the scope hinge to add strength.

6

Cut off about a foot length of string and thread it through the hole you created earlier. Now take the length you passed through and tie some knots in it so it is held in place and can't pass back through the hole.

7

Take a coin or another weighted object and stick it with adhesive tape, to the other side of the string creating a plumb-line.



(print on card)

Calculating the height of a building

TAN TABLE

Angle	tan	Angle	tan	Angle	tan	Angle	tan	Angle	tan	Angle	tan
0°	0.00	15°	0.2679	30°	0.5773	45°	1.000	60°	1.7321	75°	3.7321
1°	0.0175	16°	0.2867	31°	0.6009	46°	1.0355	61°	1.8040	76°	4.0108
2°	0.0349	17°	0.3057	32°	0.6249	47°	1.0724	62°	1.8907	77°	4.3315
3°	0.0524	18°	0.3249	33°	0.6494	48°	1.1106	63°	1.9626	78°	4.7046
4°	0.0699	19°	0.3443	34°	0.6745	49°	1.1504	64°	2.0503	79°	5.1446
5°	0.0875	20°	0.3640	35°	0.7002	50°	1.1918	65°	2.1445	80°	5.6713
6°	0.1051	21°	0.3839	36°	0.7265	51°	1.2349	66°	2.2460	81°	6.3138
7°	0.1228	22°	0.4040	37°	0.7535	52°	1.2799	67°	2.3559	82°	7.1154
8°	0.1405	23°	0.4245	38°	0.7813	53°	1.3270	68°	2.4751	83°	8.1443
9°	0.1584	24°	0.4452	39°	0.8098	54°	1.3764	69°	2.6051	84°	9.5144
10°	0.1763	25°	0.4663	40°	0.8391	55°	1.4281	70°	2.7475	85°	11.430
11°	0.1944	26°	0.4877	41°	0.8693	56°	1.4826	71°	2.9042	86°	14.301
12°	0.2126	27°	0.5095	42°	0.9004	57°	1.5399	72°	3.0777	87°	19.081
13°	0.2309	28°	0.5317	43°	0.9325	58°	1.6003	73°	3.2709	88°	28.636
14°	0.2493	29°	0.5543	44°	0.9657	59°	1.6643	74°	3.4874	89°	57.290
										90°	infinite