



stem4math

Shadow art



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Engage

Which artwork do you prefer (fill in the chosen number):

Discuss:

- Why do you prefer this artwork?
- What do you see on the picture?
- Which materials did the artist use to create the artwork?
- How is the artwork created?
- ...



Investigate

Challenge 1:

On the following 5 pages you find pictures of shadows.

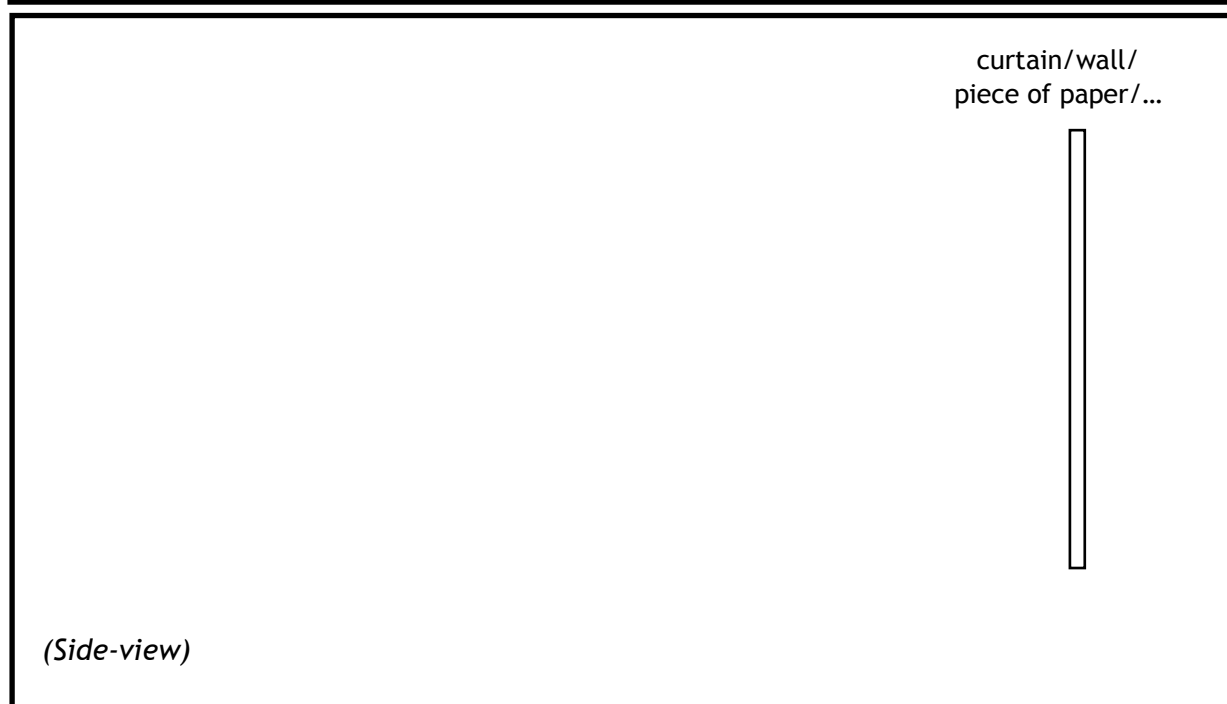
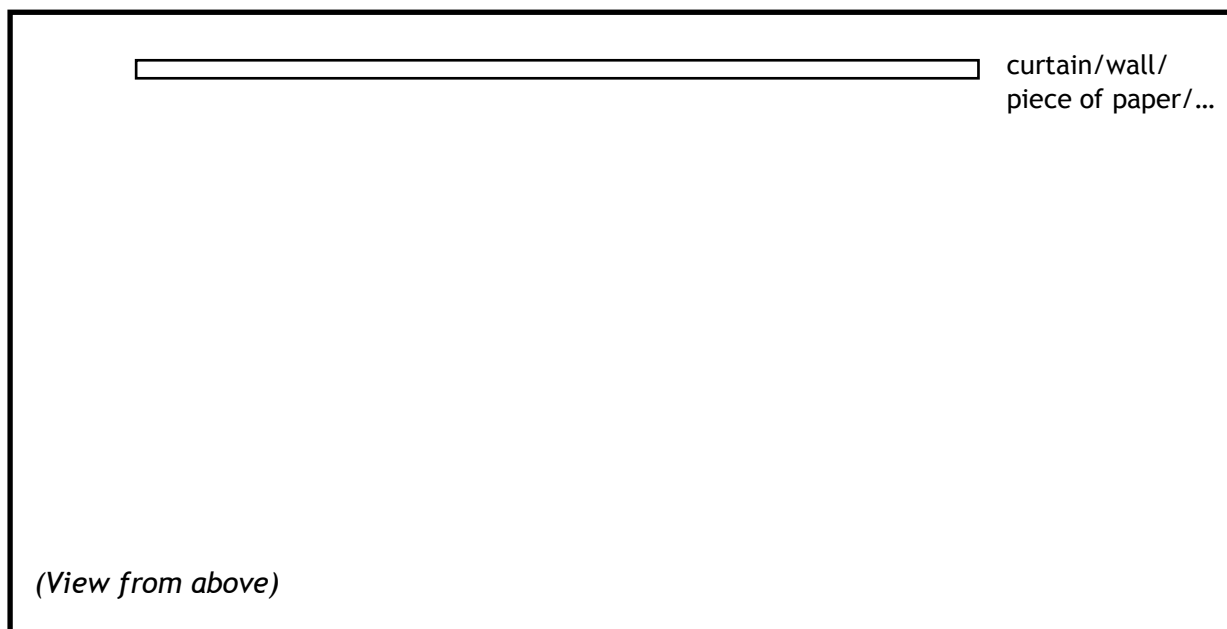
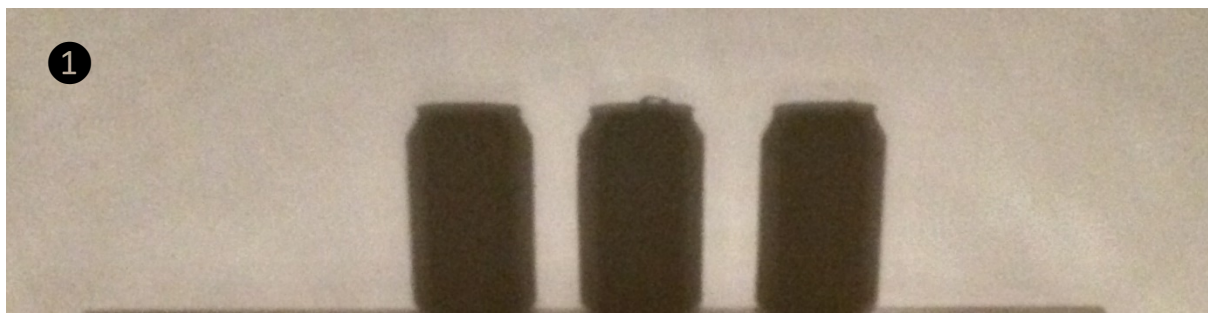
a) Create the same shadows by using the given materials:

torch, 3 tin cans, white piece of paper/wall/...

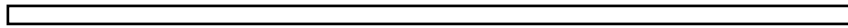
b) Sketch the setting of materials you have set up to form the shadows.

- Sketch the setup from above (floor plan).
- Sketch the setup from aside (profile).





2



curtain/wall/
piece of paper/...

(View from above)

curtain/wall/
piece of paper/...



(Side-view)



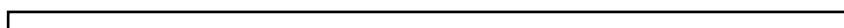
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3



curtain/wall/
piece of paper/...

(View from above)

curtain/wall/
piece of paper/...



(Side-view)



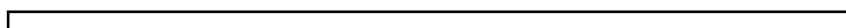
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4



curtain/wall/
piece of paper/...

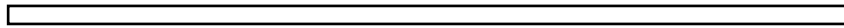
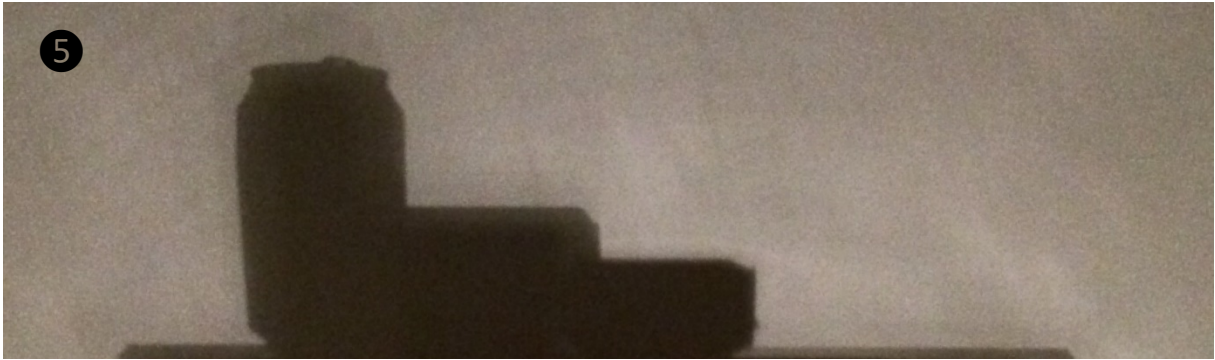
(View from above)

curtain/wall/
piece of paper/...



(Side-view)

5



curtain/wall/
piece of paper/...

(View from above)

curtain/wall/
piece of paper/...



(Side-view)



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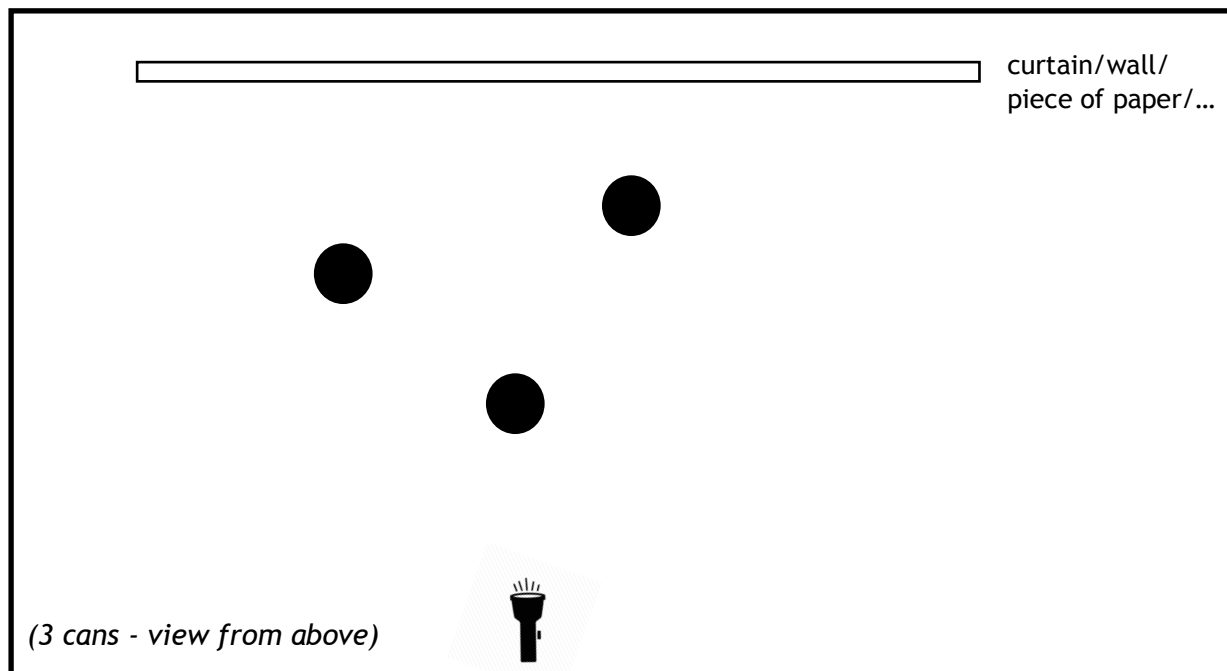
Challenge 2:

① Look at the following setup:

a) Predict how the shadow looks like when you would hold the torch.

Sketch what you think you see as a shadow.

b) Test if your prediction matches your observations.



Prediction:

(Seen from the front)

Does your prediction match your observations? No? What's different?

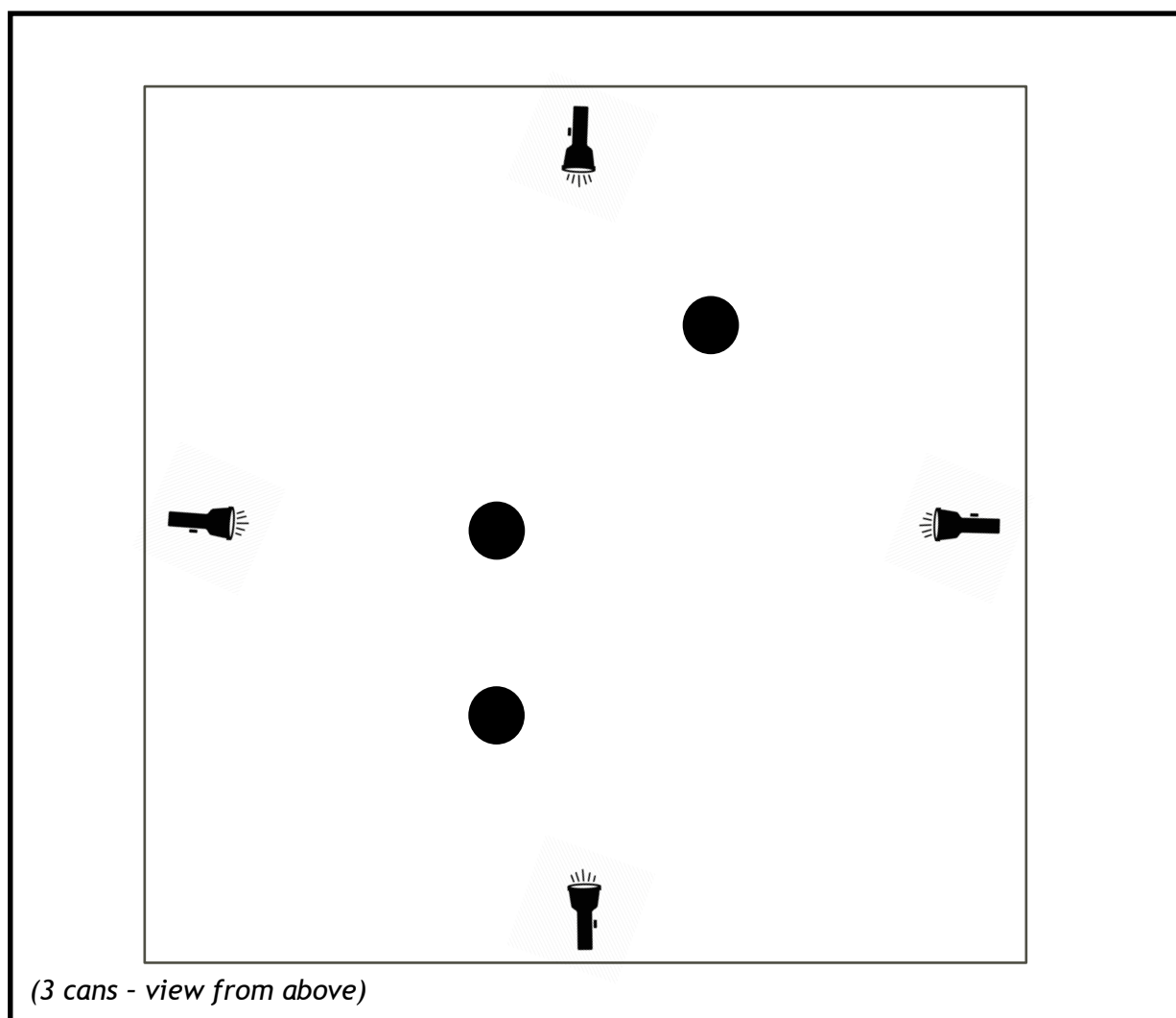
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② Look at the following shadow and setup:

- Draw a circle around the torch that you need to hold to see the given shadow.
- Test if your prediction matches your observations.



(3 cans - view from above)

Challenge 3:

① Look at the following setup:

a) Predict how the shadow looks like when you would hold the torch.

Sketch what you think you see as a shadow.

b) Test if your prediction matches your observations.



Prediction:

(Seen from the front)

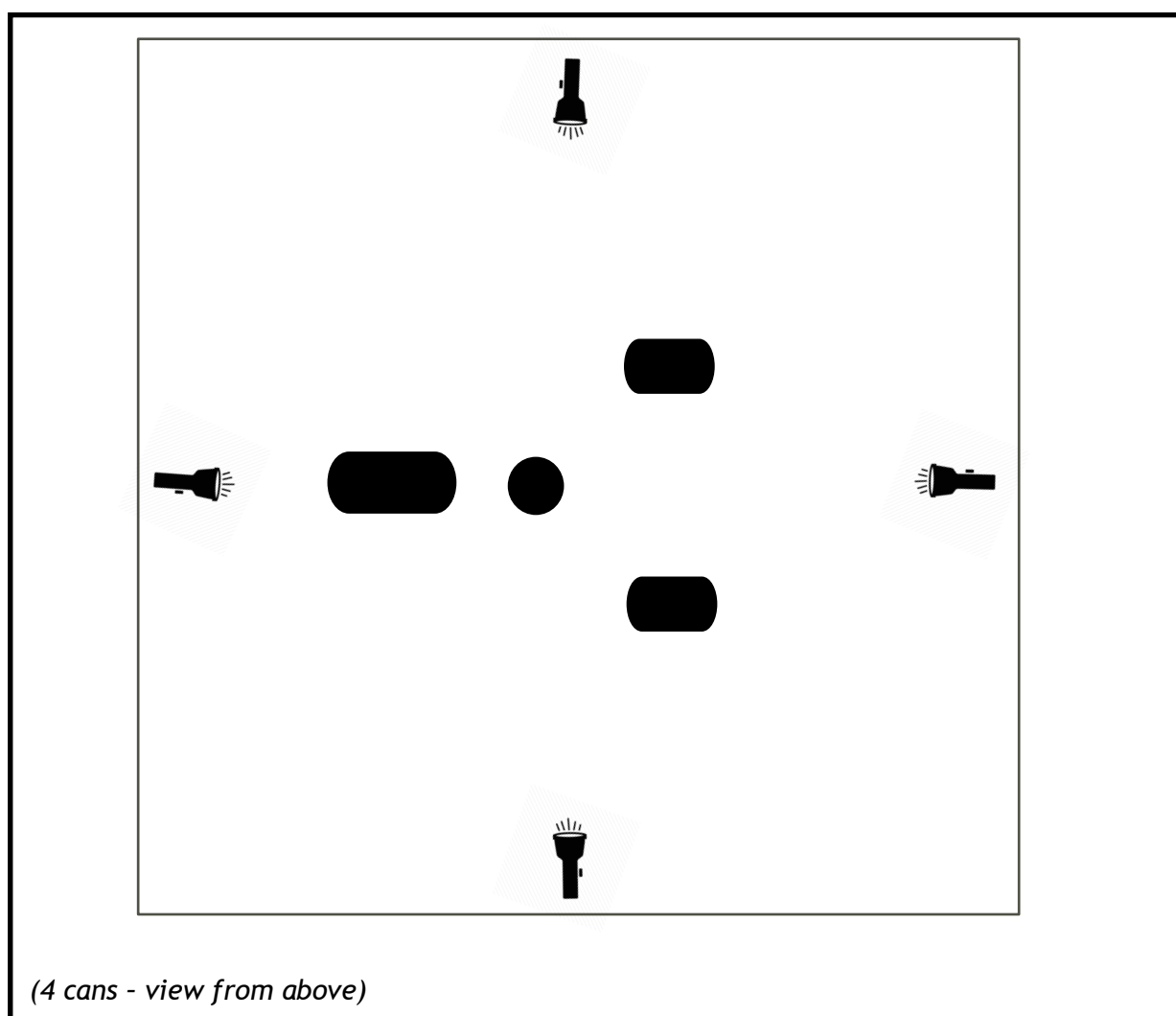
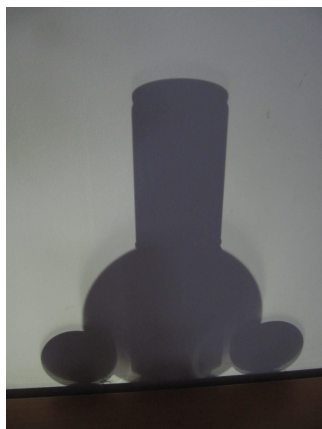
What kind of object do you see?



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② Look at the following shadow and setup:

- Draw a circle around the torch that you need to hold to see the given shadow.
- Test if your prediction matches your observations.



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Universidad de Valladolid



Vendelsömalmskolan



Haninge
kommun



vives



Conclude

How did you create the shadows during the investigation?

Where did you pay attention to concerning:

- the torch:

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- the tin cans:

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How does the distance from object to torch affect the size of the shadow?

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How does the position of the torch affect the shape of the shadow?

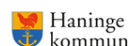
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Create

Do you now know how to create a shadow? How to make it smaller? Bigger?
Then it is now time to create your own piece of art!
Take a close look at the following artwork:



Create your own skyline

by using only 5 tin cans and some materials you can find around you.

The skyline should meet the following criteria:

- at least 5 buildings
- at least 1 sloping roof
- at least 1 building with one or more windows
- at least 1 antenna or chimney
- one building must be 2 times as high as another building
- one building must have a height of $\frac{3}{4}$ the height of another building





Plan

Sketch the floor plan of the skyline you will create:

curtain/wall/
piece of paper/...



Create

Make a setup of the materials exactly as you have drawn on the floor plan.
Work together while doing this!



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Investigate

Check if your skyline matches the criteria!

Are you happy with the result? Why or why not? Explain to each other!



Plan

Think together about how you can improve the skyline!

Are there elements you can add to your skyline (e.g. bridge, church, mosque, ...)?

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Create

Finalize your skyline so you have created a real piece of art!

Can you think of a name for your city?

Why did you choose this name?

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Report

Draw a floor plan so that your skyline can be rebuilt at another place, at another time, ... Be very precise. You have to measure!

Write the scale you use to make your plan.

curtain/wall/
piece of paper/...



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Now it is time for reflection. Discuss the following questions:

What have you learnt?

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Did you use mathematics? When? Examples?

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What did you do very well? Why?

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What went wrong? Why?

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What will you do differently next time?

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