

**Entrance to Grade 12 University Advanced Functions (MHF4U)  
or Mathematics of Data Management (MDM4U)**

*Scrap paper is available but write your final solution clearly in the space provided*

1. Find two integers whose sum is  $-31$  and whose product is  $240$ .

2. The science class is investigating projectiles and they have built catapults. Margarita's team has built a catapult that throws a table-tennis ball vertically upward. The height of the table-tennis ball in centimetres above the ground is given by the formula

$$h = 5 + 50t - 5t^2.$$

a. At what height is the table-tennis ball released?

b. What is the ball's maximum height?

c. If the ball has to stay in the air for  $10$  s to qualify for a prize, can Margarita's team win a prize?

3. Solve each of the following for  $x$ .

a.  $3^{x^2+2x} = 27$

c.  $\frac{1}{4}(2)^{x^2} = 2^x$

b.  $2^{x^2} \times 2^{3x} = \frac{1}{4}$

d.  $3^x \times 81 = 3^{5-x^2}$

4. A mirror frame is  $90$  cm by  $120$  cm. The mirror has an area of  $8800$  cm<sup>2</sup>. How wide is the frame?

5. Solve each of the following:

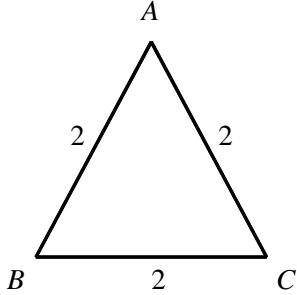
a.  $3^x + 6 = 87$

c.  $4^{x+1} - 22 = 42$

b.  $5(2^x) - 160 = 0$

d.  $\frac{3^{x-1}}{6} = \frac{81}{2}$

6. Given  $\triangle ABC$  with  $AB = BC = AC = 2$ ,



a. draw  $AD \perp BC$ .

b. find  $DC$ .

c. find  $AD$ .

d. find the measure of  $\angle C$ .

e. find the measure of  $\angle DAC$ .

f. find  $\sin 30^\circ$ ,  $\cos 30^\circ$ , and  $\tan 30^\circ$ .

g. find  $\sin 60^\circ$ ,  $\cos 60^\circ$ , and  $\tan 60^\circ$ .

7. Solve each of the following for  $x$ .

a.  $x^2 + 81 = 0$

c.  $x^2 + 15 = -12$

b.  $3(x-3)^2 = x^2 - 3$

d.  $(x+2)(x+5) = (x-4)^2$

8. From the graph of  $f(x)$  shown

a. graph  $-2f(x)$ .

b. graph  $\frac{3}{4}f(x)$ .

c. graph  $2f(x-2)$ .

