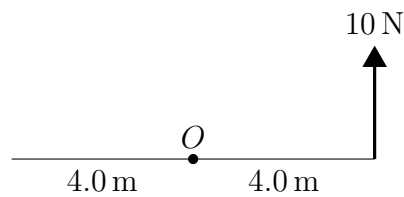# Moments ANSWERS

A.C. NORMAN

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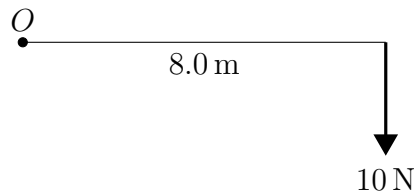
1. Calculate the moments of the forces about O in each of the following cases.

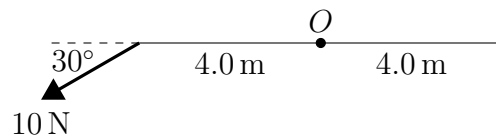   (a)

   10 N

   $$M = F \times d$$
   $$= 10\,\text{N} \times 4.0\,\text{m}$$
   $$= 40\,\text{N\,m} \ \circlearrowleft .$$

   O

   4.0 m   4.0 m

   (b)

   O

   8.0 m

   $$M = F \times d$$
   $$= 10\,\text{N} \times 8.0\,\text{m}$$
   $$= 80\,\text{N\,m} \ \circlearrowright .$$

   10 N

   (c)

   O

   30°   4.0 m   4.0 m

   10 N

   $$M = F \times d$$
   $$= 10\,\text{N} \times 4.0\,\text{m} \times \sin(30°)$$
   $$= 20\,\text{N\,m} \ \circlearrowleft .$$

2. Find the moment of a 20 N force about O (where O is the centre of the rectangle) when the force acts

   (a) along AD (as shown),
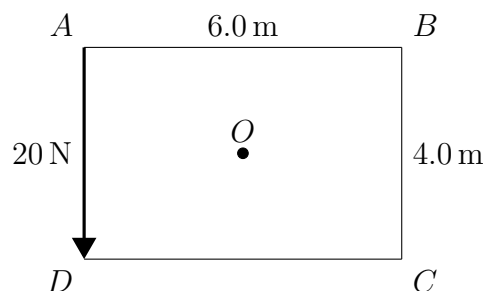
   A 6.0 m B

   O

   20 N   4.0 m

   D C

   $$M = F \times d$$
   $$= 20\,\text{N} \times 3.0\,\text{m}$$
   $$= 60\,\text{N\,m} \ \circlearrowleft .$$

(b) along DC,

$$M = F \times d$$
$$= 20\,\text{N} \times 2.0\,\text{m}$$
$$= 40\,\text{N m} \quad \circlearrowright.$$

(c) along a line joining BD.

$$M = F \times d$$
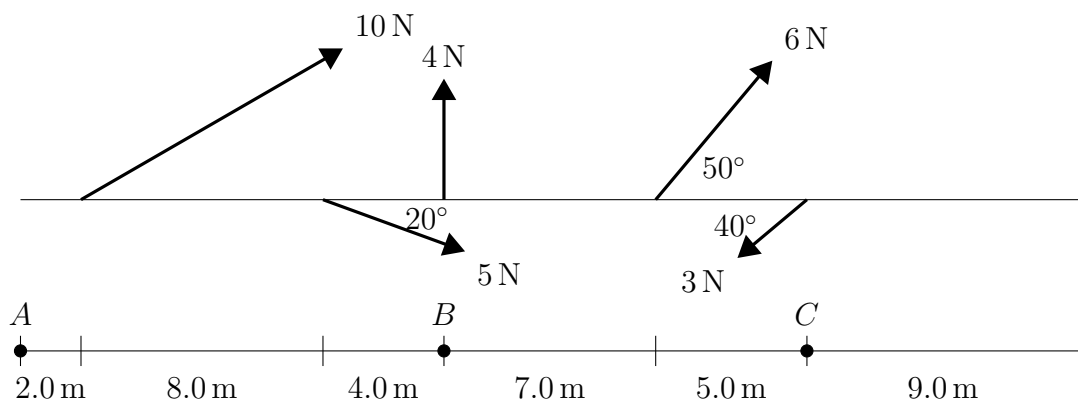$$= 20\,\text{N} \times 0.0\,\text{m}$$
$$= 0\,\text{N m}.$$

3. Calculate the resultant moment about

   (a) A,

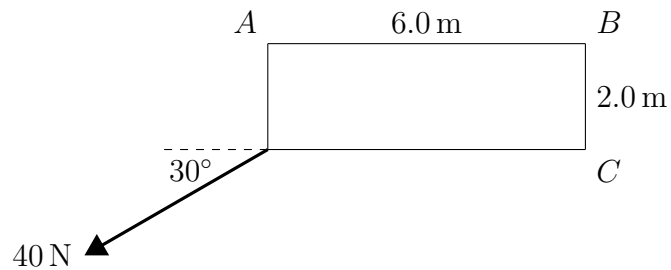   (b) B,

   (c) C,

   in the following diagram. The distances are given along the line below.
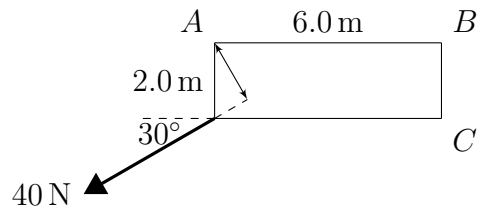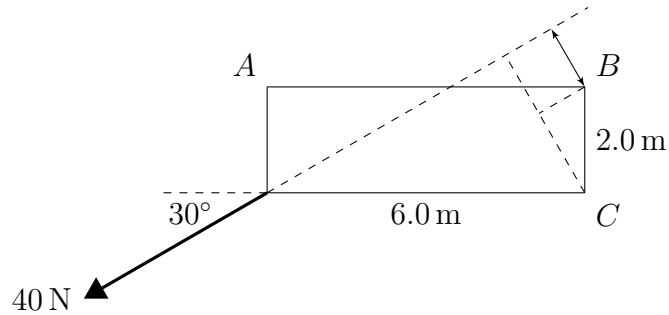

4. The following diagram shows a force of $40\,\text{N}$.
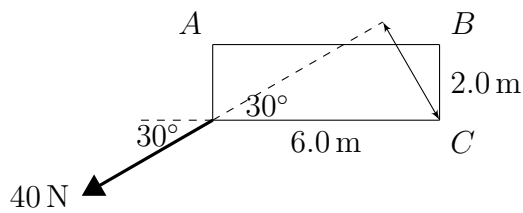

Calculate the moment of this force about

   (a) A,

$$M = F \times d$$
$$= 40\,\text{N} \times 2.0\,\text{m} \times \cos{(30°)}$$
$$= 69\,\text{N}\,\text{m} \circlearrowright.$$

(b) B,

$$M = F \times d$$
$$= 40\,\text{N} \times (6.0\,\text{m} \times \sin{(30°)} - 2.0\,\text{m} \times \cos{(30°)})$$
$$= 51\,\text{N}\,\text{m} \circlearrowright.$$

(c) C.

$$M = F \times d$$
$$= 40\,\text{N} \times 6.0\,\text{m} \times \sin{(30°)}$$
$$= 120\,\text{N}\,\text{m} \circlearrowright.$$