Conduct the following calculations using the given **Grove GMK 5130-2** and **Kobelco CKE2500** Load Charts (provided separately to this document).

Scenario 1

The **Grove GMK 5130-2 All Terrain Crane** has a standard **crane mass** of **60 tonnes** when fitted with **8.5 tonnes** of counterweight, **11/18** bi-fold swing away and a **20 tonne** capacity hook block. Today you are working on a new construction site with the earthworks having just been completed. You receive a site plan that shows you are to set up near underground services. The underground services are at a depth of 4m.

Question 1

The Grove **GMK 5130-2** is lifting an **60-tonne** load. The crane has been reconfigured to have **40.1 tonnes** of counterweight and a **100 tonne hook block** fitted to conduct the lift. Each of the four outrigger feet on the crane are provided with timbers that are **1.9 m** long by **1.9 m** wide. Calculate **the maximum ground pressure** that will be applied to the ground when lifting directly above an outrigger foot.

The answer is to be **rounded up** to the nearest **0.1 tonnes/m^2**.

Workings and adjustments must be shown in your written answer. Show units in your answer.

Question 2

The same crane from **Question 1** is now setup on **Loose Sand**. What is the **minimum** outrigger pad area required to not sink into the loose sand? Show working.

The answer is to be rounded up to the nearest 0.1 m.

Note:

Ground type	**Maximum permissible ground pressure, P_{MAX} (Tonnes per m^2)**
Hard rock	200
Shale rock and sandstone	80
Compacted gravel (with up to 20% sand)	40
Asphalt	20
Compacted sand	20
Stiff clay (dry)	20
Soft clay (dry)	10
Loose sand	10
Wet clay	Less than 10

Scenario 2

Now you have to setup the **Grove GMK 5130-2** with **23.5t** counterweight and **4 parts of line** on the 50T hook block you extend the boom **45.99m**.

Question 3

What is the **counterweight** configuration required to achieve a counterweight configuration 23.5t?

Question 4

What is the **maximum** and **minimum** working **radius** in this boom configuration?

Question 5

What is the maximum speed the hook block can be raised in this boom configuration? Show workings.

Scenario 3

The site you are working on requires that the crane load chart be derated to **75%**. While the crane is still setup in the configuration of **Scenario 2**, you have been asked to pick up **9 tonnes** at **10m** radius, slew **130 degrees** and lower the load to platform at a **16 m** radius? The load requires the use of **75kg** of rigging.

Question 6

Part 1: Observing the site requirements, what percentage of the site's allowed rated capacity is the crane at when the load is lifted at the 10m radius? Round up to 2 decimal places. Show workings.

Part 2: Observing the site requirements, what **percentage** of site's allowed **rated capacity** is the crane at when the load is landed at the **16m** radius? **Round up** to **2 decimal** places. Show workings.

Scenario 4

You have been asked to operate a **Kobelco CKE2500** Crawler Crane in luffing jib configuration. You have been told that the crane has **45.7m** boom inserted and **61.0m** of jib. You want to check the crane configuration before you begin lifting because you weren't there when the crane was rigged.

Question 7

What is the **total counterweight** required for stable crane operation in this configuration?

Question 8

What are the **most flexible** configurations for the **boom** and **jib** arrangements for **scenario 4**?

Boom Arrangements (Lengths)

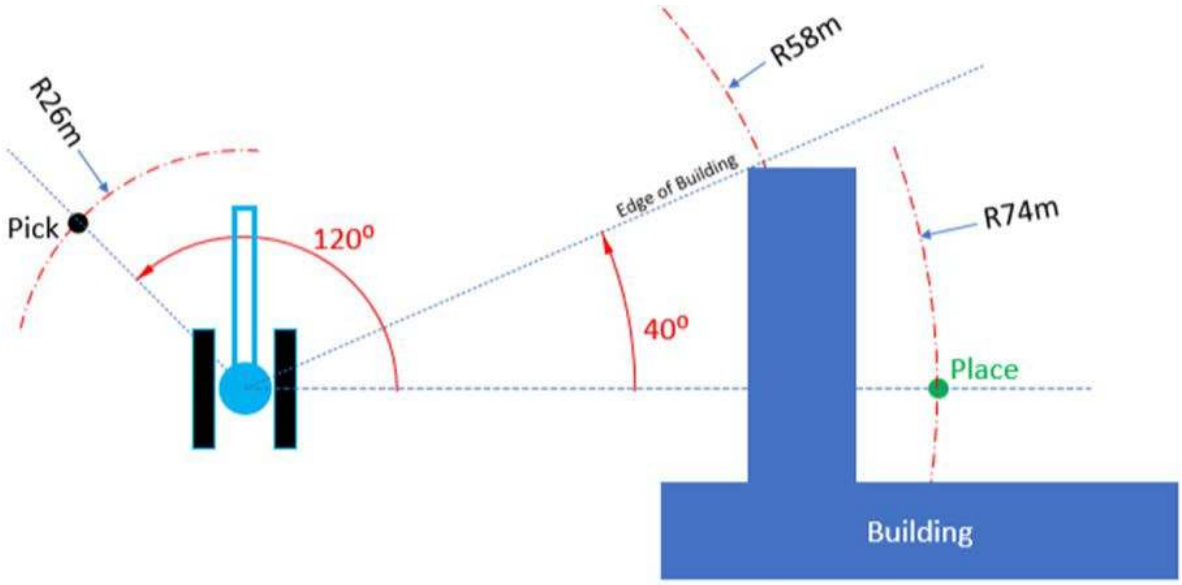
Jib Arrangements (Lengths)

Question 9

How many **falls of rope** should be on the **hook block**?

Scenario 5

Using the configuration provided in **Scenario 4** for the **Kobelco CKE2500** configuration, you have been asked to pick up a **3.5 tonne** load (including rigging) at a **27m** radius and place it at a **75m** radius. Refer to the load charts and manufacturers specifications.



Question 10

What main **boom angle** is required to pick up the load vertically?

Question 11

Can you **complete** this operation in a **single lift**? Explain?

Scenario 6

The **Grove GMK 5130-2 All Terrain Crane** has a standard **crane mass** of **60 tonnes** when fitted with **8.5 tonnes** of counterweight, **11/18** bi-fold swing away and a **20 tonne** capacity hook block. Today you are working on a new construction site with the earthworks having just been completed. You receive a site plan that shows you are to set up near underground services. The underground services are at a depth of 4m.

Question 12

The Grove **GMK 5130-2** is lifting an **70-tonne** load. The crane has been reconfigured to have **40.1 tonnes** of counterweight and a **100 tonne hook block** fitted to conduct the lift. Each of the four outrigger feet on the crane are provided with timbers that are **2.3 m** long by **2.3 m** wide. Calculate **the maximum ground pressure** that will be applied to the ground when lifting directly above an outrigger foot.

The answer is to be **rounded up** to the nearest **0.1 tonnes/m^2**.

Workings and adjustments must be shown in your written answer. Show units in your answer.

Question 13

The same crane from **Question 12** is now setup on **Loose Sand**. What is the **minimum** outrigger pad area required to not sink into the loose sand? Show working.

The answer is to be rounded up to the nearest 0.1 m.

Note:

Ground type	**Maximum permissible ground pressure, P_{MAX} (Tonnes per m^2)**
Hard rock	200
Shale rock and sandstone	80
Compacted gravel (with up to 20% sand)	40
Asphalt	20
Compacted sand	20
Stiff clay (dry)	20
Soft clay (dry)	10
Loose sand	10
Wet clay	Less than 10

Scenario 7

Now you have to setup the **Grove GMK 5130-2** with **23.5t** counterweight and **4 parts of line** on the 50T hook block you extend the boom **50.71m**.

Question 14

What is the **counterweight** configuration required to achieve a counterweight configuration 23.5t?

Question 15

What is the **maximum** and **minimum** working **radius** in this boom configuration?

Question 16

What is the maximum speed the hook block can be raised in this boom configuration? Show workings.

Scenario 8

The site you are working on requires that the crane load chart be derated to **75%**. While the crane is still setup in the configuration of **Scenario 7**, you have been asked to pick up **8.5 tonnes** at **11m** radius, slew **130 degrees** and lower the load to platform at a **17 m** radius? The load requires the use of **100kg** of rigging.

Question 17

Part 1: Observing the site requirements, what percentage of the site's allowed rated capacity is the crane at when the load is lifted at the 11m radius? Round up to 2 decimal places. Show workings.

Part 2: Observing the site requirements, what **percentage** of site's allowed **rated capacity** is the crane at when the load is landed at the **17m** radius? **Round up** to **2 decimal** places. Show workings.

Scenario 9

You have been asked to operate a **Kobelco CKE2500** Crawler Crane in luffing jib configuration. You have been told that the crane has **45.7m** boom inserted and **51.8m** of jib. You want to check the crane configuration before you begin lifting because you weren't there when the crane was rigged.

Question 18

What is the **total counterweight** required for stable crane operation in this configuration?

Question 19

What are the **most flexible** configurations for the **boom** and **jib** arrangements for **scenario 9**?

Boom Arrangements (Lengths)

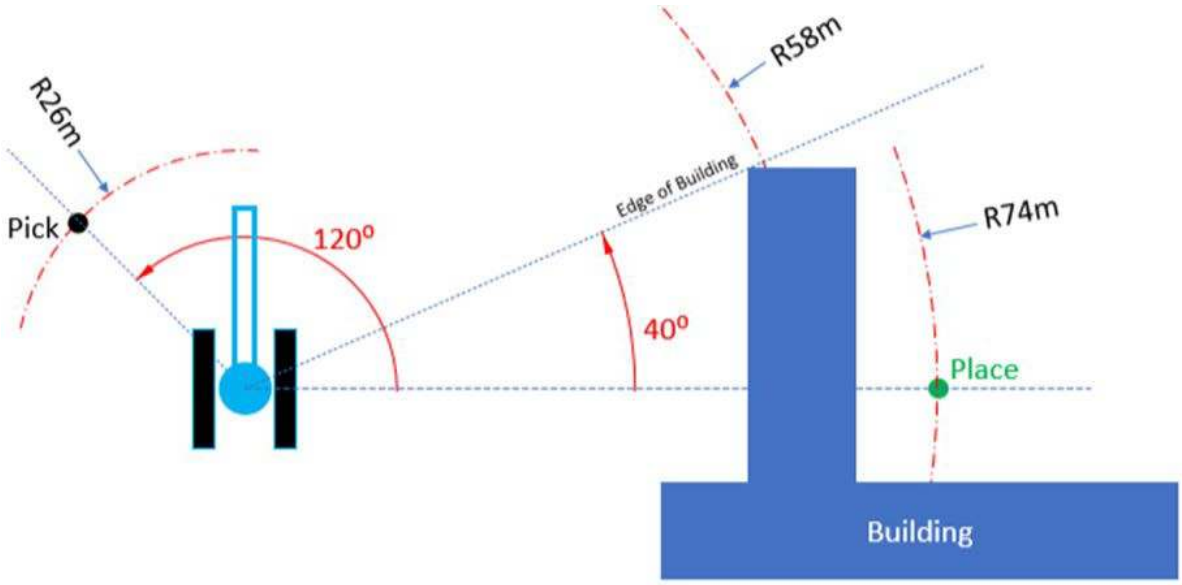
Jib Arrangements (Lengths)

Question 20

How many **falls of rope** should be on the **hook block**?

Scenario 10

Using the configuration provided in **Scenario 9** for the **Kobelco CKE2500** configuration, you have been asked to pick up a **3 tonne** load (including rigging) at a **25m** radius and place it at a **73m** radius. Refer to the load charts and manufacturers specifications.



Question 21

What main **boom angle** is required to pick up the load vertically?

Question 22

Can you **complete** this operation in a **single lift**? Explain?

Scenario 11

The **Grove GMK 5130-2 All Terrain Crane** has a standard **crane mass** of **60 tonnes** when fitted with **8.5 tonnes** of counterweight, **11/18** bi-fold swing away and a **20 tonne** capacity hook block. Today you are working on a new construction site with the earthworks having just been completed. You receive a site plan that shows you are to set up near underground services. The underground services are at a depth of 4m.

Question 23

The Grove **GMK 5130-2** is lifting an **30-tonne** load. The crane has been reconfigured to have **23.5 tonnes** of counterweight and a **100 tonne hook block** fitted to conduct the lift. Each of the four outrigger feet on the crane are provided with timbers that are **1.4 m** long by **2.1 m** wide. Calculate **the maximum ground pressure** that will be applied to the ground when lifting directly above an outrigger foot.

The answer is to be **rounded up** to the nearest **0.1 tonnes/m^2**.

Workings and adjustments must be shown in your written answer. Show units in your answer.

Question 24

The same crane from **Question 23** is now setup on **Loose Sand**. What is the **minimum** outrigger pad area required to not sink into the loose sand? Show working.

The answer is to be rounded up to the nearest 0.1 m.

Note:

Ground type	**Maximum permissible ground pressure, P_{MAX} (Tonnes per m^2)**
Hard rock	200
Shale rock and sandstone	80
Compacted gravel (with up to 20% sand)	40
Asphalt	20
Compacted sand	20
Stiff clay (dry)	20
Soft clay (dry)	10
Loose sand	10
Wet clay	Less than 10

Scenario 12

Now you have to setup the **Grove GMK 5130-2** with **23.5t** counterweight and **4 parts of line** on the 50T hook block you extend the boom **41.24m**.

Question 25

What is the **counterweight** configuration required to achieve a counterweight configuration 23.5t?

Question 26

What is the **maximum** and **minimum** working **radius** in this boom configuration?

Question 27

What is the maximum speed the hook block can be raised in this boom configuration? Show workings.

Scenario 13

The site you are working on requires that the crane load chart be derated to **80%**. While the crane is still setup in the configuration of **Scenario 12**, you have been asked to pick up **16 tonnes** at **7m** radius, slew **130 degrees** and lower the load to platform at a **12 m** radius? The load requires the use of **150kg** of rigging.

Question 28

Part 1: Observing the site requirements, what percentage of the site's allowed rated capacity is the crane at when the load is lifted at the 7m radius? Round up to 2 decimal places. Show workings.

Part 2: Observing the site requirements, what **percentage** of site's allowed **rated capacity** is the crane at when the load is landed at the **12m** radius? **Round up** to **2 decimal** places. Show workings.

Scenario 14

You have been asked to operate a **Kobelco CKE2500** Crawler Crane in luffing jib configuration. You have been told that the crane has **51.8m** boom inserted and **61.0m** of jib. You want to check the crane configuration before you begin lifting because you weren't there when the crane was rigged.

Question 29

What is the **total counterweight** required for stable crane operation in this configuration?

Question 30

What are the **most flexible** configurations for the **boom** and **jib** arrangements for **scenario 14**?

Boom Arrangements (Lengths)

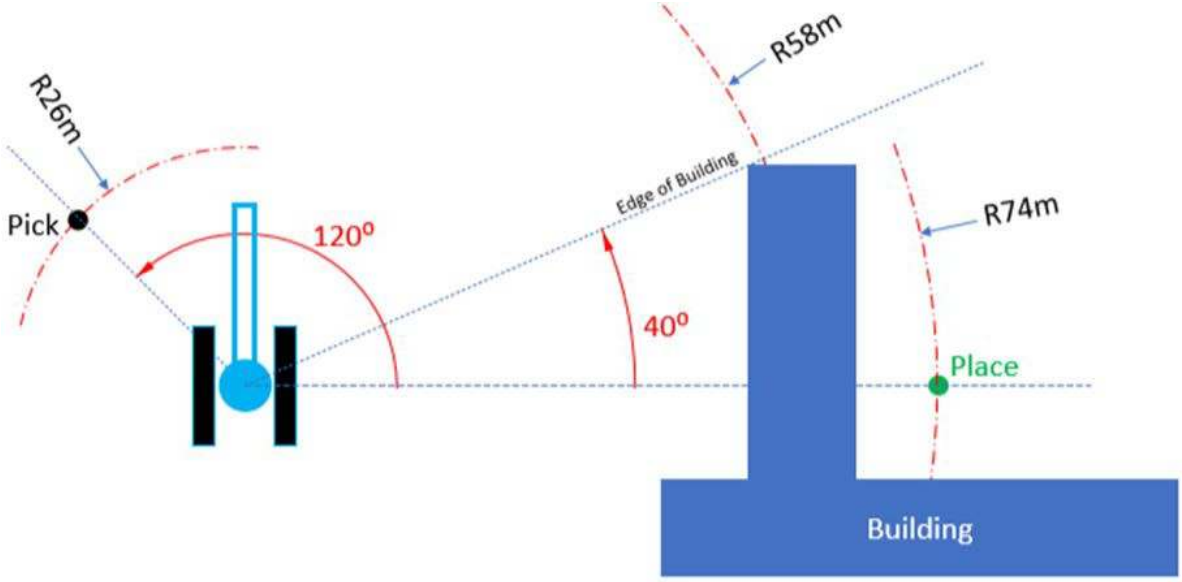
Jib Arrangements (Lengths)

Question 31

How many **falls of rope** should be on the **hook block**?

Scenario 15

Using the configuration provided in **Scenario 14** for the **Kobelco CKE2500** configuration, you have been asked to pick up a **3.2 tonne** load (including rigging) at a **38m** radius and place it at a **72m** radius. Refer to the load charts and manufacturers specifications.



Question 32

What main **boom angle** is required to pick up the load vertically?

Question 33

Can you **complete** this operation in a **single lift**? Explain?