Linux Foundation

CKS Exam

Certified Kubernetes Security Specialist

Questions & Answers
Demo

Version: 6.0

Question: 1

Create a new ServiceAccount named backend-sa in the existing namespace default, which has the capability to list the pods inside the namespace default.
Create a new Pod named backend-pod in the namespace default, mount the newly created sa backend-sa to the pod, and Verify that the pod is able to list pods.
Ensure that the Pod is running.

Answer: See the Explanation below:

Explanation:

A service account provides an identity for processes that run in a Pod.

When you (a human) access the cluster (for example, using kubectl), you are authenticated by the apiserver as a particular User Account (currently this is usually admin, unless your cluster administrator has customized your cluster). Processes in containers inside pods can also contact the apiserver. When they do, they are authenticated as a particular Service Account (for example, default).

When you create a pod, if you do not specify a service account, it is automatically assigned the default service account in the same namespace. If you get the raw json or yaml for a pod you have created (for example, kubectl get pods/<podname> -o yaml), you can see the spec.serviceAccountName field has been automatically set.
You can access the API from inside a pod using automatically mounted service account credentials, as described in Accessing the Cluster. The API permissions of the service account depend on the authorization plugin and policy in use.
In version 1.6+, you can opt out of automounting API credentials for a service account by setting automountServiceAccountToken: false on the service account:

```
apiVersion: v1
kind: ServiceAccount
metadata:
  name: build-robot
automountServiceAccountToken: false
...
```

In version 1.6+, you can also opt out of automounting API credentials for a particular pod:

```
apiVersion: v1
kind: Pod
metadata:
  name: my-pod
```

```
spec:
  serviceAccountName: build-robot
  automountServiceAccountToken: false
  ...
```

The pod spec takes precedence over the service account if both specify a automountServiceAccountToken value.

Question: 2

Fix all issues via configuration and restart the affected components to ensure the new setting takes effect.

Fix all of the following violations that were found against the API server:-

a. Ensure the --authorization-mode argument includes RBAC

b. Ensure the --authorization-mode argument includes Node

c. Ensure that the --profiling argument is set to false

Fix all of the following violations that were found against the Kubelet:-

a. Ensure the --anonymous-auth argument is set to false.

b. Ensure that the --authorization-mode argument is set to Webhook.

Fix all of the following violations that were found against the ETCD:-

a. Ensure that the --auto-tls argument is not set to true

Hint: Take the use of Tool Kube-Bench

Answer: See the Explanation below.

Explanation:

API server:

Ensure the --authorization-mode argument includes RBAC

Turn on Role Based Access Control.

Role Based Access Control (RBAC) allows fine-grained control over the operations that different entities can perform on different objects in the cluster. It is recommended to use the RBAC authorization mode.

Fix - Buildtime

Kubernetes

```
apiVersion: v1
kind: Pod
metadata:
  creationTimestamp: null
  labels:
    component: kube-apiserver
    tier: control-plane
  name: kube-apiserver
  namespace: kube-system
spec:
  containers:
  - command:
+   - kube-apiserver
+   - --authorization-mode=RBAC,Node
    image: gcr.io/google_containers/kube-apiserver-amd64:v1.6.0
    livenessProbe:
      failureThreshold: 8
      httpGet:
        host: 127.0.0.1
        path: /healthz
        port: 6443
        scheme: HTTPS
      initialDelaySeconds: 15
      timeoutSeconds: 15
    name: kube-apiserver-should-pass
    resources:
      requests:
        cpu: 250m
    volumeMounts:
    - mountPath: /etc/kubernetes/
      name: k8s
      readOnly: true
    - mountPath: /etc/ssl/certs
      name: certs
    - mountPath: /etc/pki
      name: pki
  hostNetwork: true
  volumes:
  - hostPath:
      path: /etc/kubernetes
    name: k8s
  - hostPath:
      path: /etc/ssl/certs
    name: certs
  - hostPath:
      path: /etc/pki
    name: pki
```

Ensure the --authorization-mode argument includes Node

Remediation: Edit the API server pod specification file /etc/kubernetes/manifests/kube-apiserver.yaml on the master node and set the --authorization-mode parameter to a value that includes Node.

```
--authorization-mode=Node,RBAC
```

Audit:

```
/bin/ps -ef | grep kube-apiserver | grep -v grep
```

Expected result:

'Node,RBAC' has 'Node'

Ensure that the --profiling argument is set to false

Remediation: Edit the API server pod specification file /etc/kubernetes/manifests/kube-apiserver.yaml on the master node and set the below parameter.

```
--profiling=false
```

Audit:

```
/bin/ps -ef | grep kube-apiserver | grep -v grep
```

Expected result:

'false' is equal to 'false'

Fix all of the following violations that were found against the Kubelet:-

Ensure the --anonymous-auth argument is set to false.

Remediation: If using a Kubelet config file, edit the file to set authentication: anonymous: enabled to false. If using executable arguments, edit the kubelet service file /etc/systemd/system/kubelet.service.d/10-kubeadm.conf on each worker node and set the below parameter in KUBELET_SYSTEM_PODS_ARGS variable.

```
--anonymous-auth=false
```

Based on your system, restart the kubelet service. For example:

```
systemctl daemon-reload
systemctl restart kubelet.service
```

Audit:

```
/bin/ps -fC kubelet
```

Audit Config:

```
/bin/cat /var/lib/kubelet/config.yaml
```

Expected result:

'false' is equal to 'false'

2) Ensure that the --authorization-mode argument is set to Webhook.

Audit

```
docker inspect kubelet | jq -e '.[0].Args[] | match("--authorization-mode=Webhook").string'
```

Returned Value: --authorization-mode=Webhook

Fix all of the following violations that were found against the ETCD:-

a. Ensure that the --auto-tls argument is not set to true

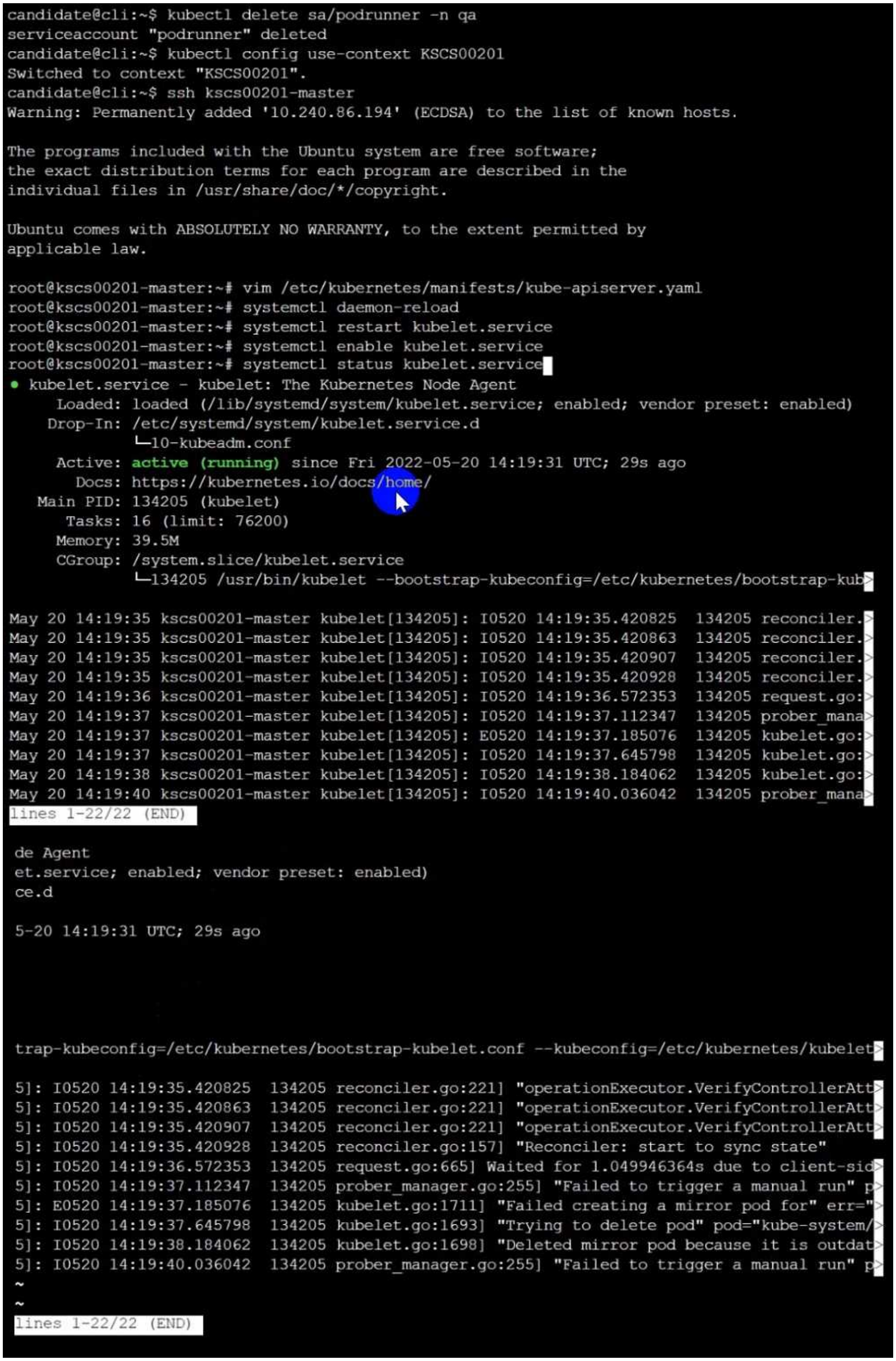
Do not use self-signed certificates for TLS. etcd is a highly-available key value store used by Kubernetes deployments for persistent storage of all of its REST API objects. These objects are sensitive in nature and should not be available to unauthenticated clients. You should enable the client authentication via valid certificates to secure the access to the etcd service.

Fix - Buildtime

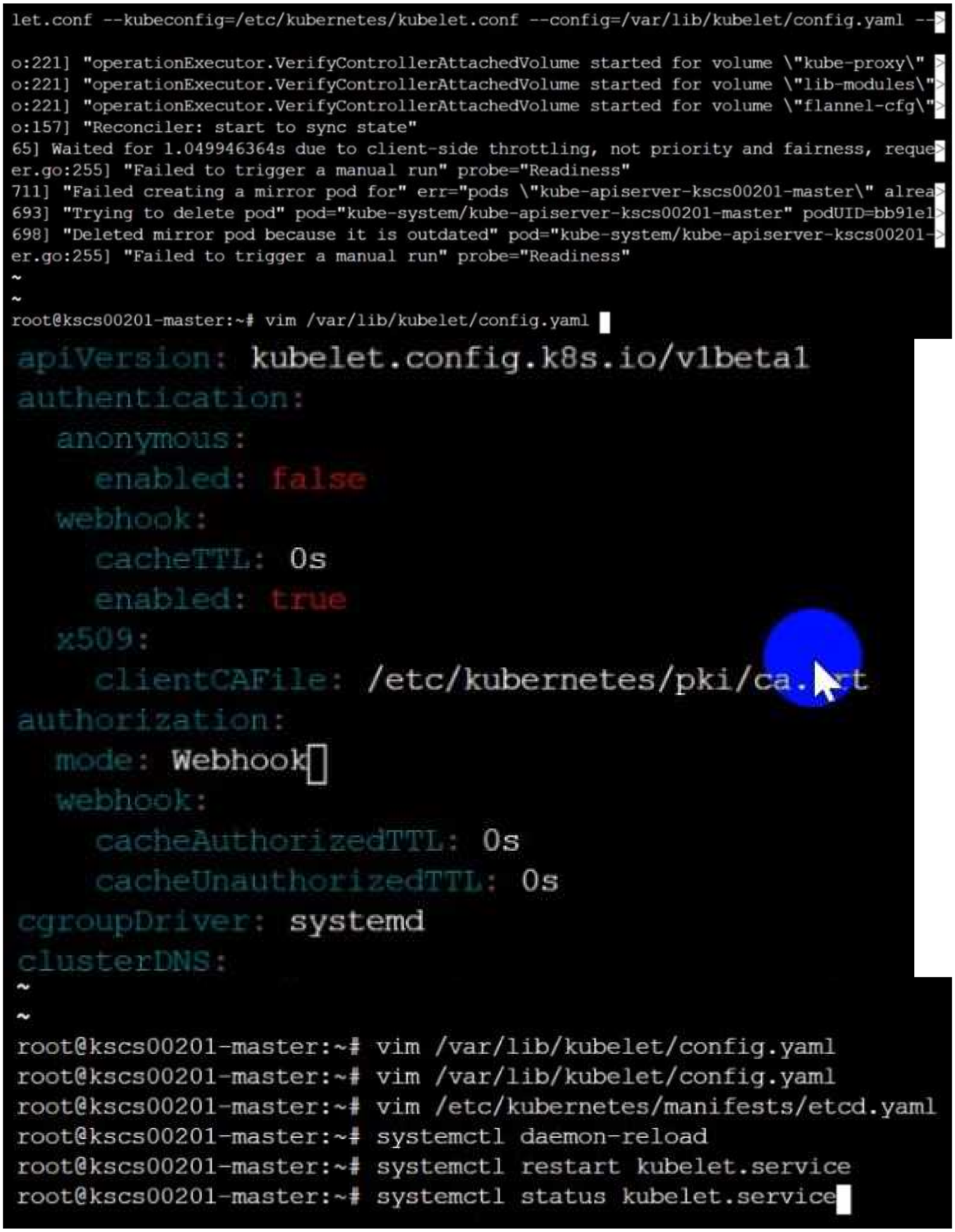
Kubernetes

```
apiVersion: v1
kind: Pod
metadata:
 annotations:
  scheduler.alpha.kubernetes.io/critical-pod: ""
 creationTimestamp: null
 labels:
    component: etcd
    tier: control-plane
  name: etcd
  namespace: kube-system
spec:
  containers:
  - command:
+   - etcd
+   - --auto-tls=true
    image: k8s.gcr.io/etcd-amd64:3.2.18
    imagePullPolicy: IfNotPresent
    livenessProbe:
      exec:
        command:
        - /bin/sh
        - -ec
        - ETCDCTL_API=3 etcdctl --endpoints=https://[192.168.22.9]:2379 --
cacert=/etc/kubernetes/pki/etcd/ca.crt
          --cert=/etc/kubernetes/pki/etcd/healthcheck-client.crt --
key=/etc/kubernetes/pki/etcd/healthcheck-client.key
          get foo
      failureThreshold: 8
      initialDelaySeconds: 15
      timeoutSeconds: 15
    name: etcd-should-fail
    resources: {}
    volumeMounts:
    - mountPath: /var/lib/etcd
      name: etcd-data
    - mountPath: /etc/kubernetes/pki/etcd
      name: etcd-certs
  hostNetwork: true
  priorityClassName: system-cluster-critical
  volumes:
  - hostPath:
      path: /var/lib/etcd
      type: DirectoryOrCreate
    name: etcd-data
  - hostPath:
      path: /etc/kubernetes/pki/etcd
      type: DirectoryOrCreate
    name: etcd-certs
status: {}
```

Explanation:

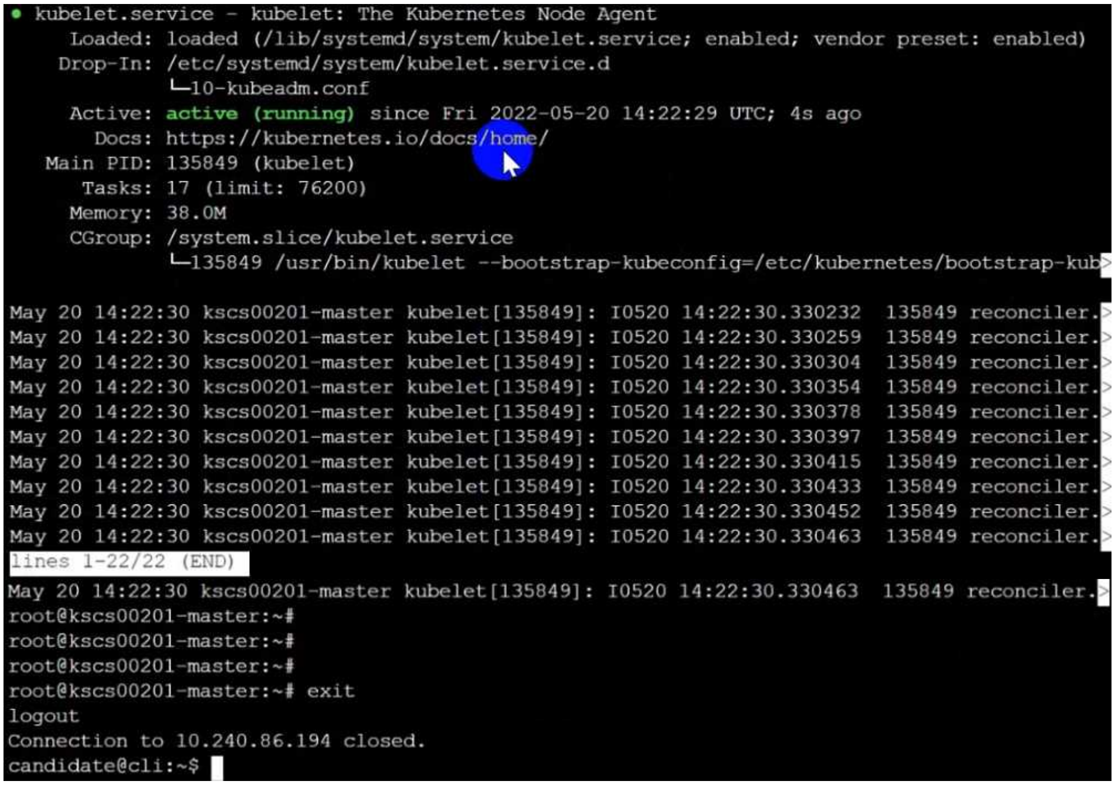


```
candidate@cli:~$ kubectl delete sa/podrunner -n qa
serviceaccount "podrunner" deleted
candidate@cli:~$ kubectl config use-context KSCS00201
Switched to context "KSCS00201".
candidate@cli:~$ ssh kscs00201-master
Warning: Permanently added '10.240.86.194' (ECDSA) to the list of known hosts.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

root@kscs00201-master:~# vim /etc/kubernetes/manifests/kube-apiserver.yaml
root@kscs00201-master:~# systemctl daemon-reload
root@kscs00201-master:~# systemctl restart kubelet.service
root@kscs00201-master:~# systemctl enable kubelet.service
root@kscs00201-master:~# systemctl status kubelet.service
● kubelet.service - kubelet: The Kubernetes Node Agent
     Loaded: loaded (/lib/systemd/system/kubelet.service; enabled; vendor preset: enabled)
    Drop-In: /etc/systemd/system/kubelet.service.d
             └─10-kubeadm.conf
     Active: active (running) since Fri 2022-05-20 14:19:31 UTC; 29s ago
       Docs: https://kubernetes.io/docs/home/
   Main PID: 134205 (kubelet)
      Tasks: 16 (limit: 76200)
     Memory: 39.5M
     CGroup: /system.slice/kubelet.service
             └─134205 /usr/bin/kubelet --bootstrap-kubeconfig=/etc/kubernetes/bootstrap-kub>

May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420825  134205 reconciler.>
May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420863  134205 reconciler.>
May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420907  134205 reconciler.>
May 20 14:19:35 kscs00201-master kubelet[134205]: I0520 14:19:35.420928  134205 reconciler.>
May 20 14:19:36 kscs00201-master kubelet[134205]: I0520 14:19:36.572353  134205 request.go:>
May 20 14:19:37 kscs00201-master kubelet[134205]: I0520 14:19:37.112347  134205 prober_mana>
May 20 14:19:37 kscs00201-master kubelet[134205]: E0520 14:19:37.185076  134205 kubelet.go:>
May 20 14:19:37 kscs00201-master kubelet[134205]: I0520 14:19:37.645798  134205 kubelet.go:>
May 20 14:19:38 kscs00201-master kubelet[134205]: I0520 14:19:38.184062  134205 kubelet.go:>
May 20 14:19:40 kscs00201-master kubelet[134205]: I0520 14:19:40.036042  134205 prober_mana>
lines 1-22/22 (END)

de Agent
et.service; enabled; vendor preset: enabled)
ce.d

5-20 14:19:31 UTC; 29s ago




trap-kubeconfig=/etc/kubernetes/bootstrap-kubelet.conf --kubeconfig=/etc/kubernetes/kubelet>

5]: I0520 14:19:35.420825  134205 reconciler.go:221] "operationExecutor.VerifyControllerAtt>
5]: I0520 14:19:35.420863  134205 reconciler.go:221] "operationExecutor.VerifyControllerAtt>
5]: I0520 14:19:35.420907  134205 reconciler.go:221] "operationExecutor.VerifyControllerAtt>
5]: I0520 14:19:35.420928  134205 reconciler.go:157] "Reconciler: start to sync state"
5]: I0520 14:19:36.572353  134205 request.go:665] Waited for 1.049946364s due to client-sid>
5]: I0520 14:19:37.112347  134205 prober_manager.go:255] "Failed to trigger a manual run" p>
5]: E0520 14:19:37.185076  134205 kubelet.go:1711] "Failed creating a mirror pod for" err=">
5]: I0520 14:19:37.645798  134205 kubelet.go:1693] "Trying to delete pod" pod="kube-system/>
5]: I0520 14:19:38.184062  134205 kubelet.go:1698] "Deleted mirror pod because it is outdat>
5]: I0520 14:19:40.036042  134205 prober_manager.go:255] "Failed to trigger a manual run" p>
~
~
lines 1-22/22 (END)
```



```
let.conf --kubeconfig=/etc/kubernetes/kubelet.conf --config=/var/lib/kubelet/config.yaml --

o:221] "operationExecutor.VerifyControllerAttachedVolume started for volume \"kube-proxy\"
o:221] "operationExecutor.VerifyControllerAttachedVolume started for volume \"lib-modules\"
o:221] "operationExecutor.VerifyControllerAttachedVolume started for volume \"flannel-cfg\"
o:157] "Reconciler: start to sync state"
65] Waited for 1.049946364s due to client-side throttling, not priority and fairness, reque
er.go:255] "Failed to trigger a manual run" probe="Readiness"
711] "Failed creating a mirror pod for" err="pods \"kube-apiserver-kscs00201-master\" alrea
693] "Trying to delete pod" pod="kube-system/kube-apiserver-kscs00201-master" podUID=bb91e1
698] "Deleted mirror pod because it is outdated" pod="kube-system/kube-apiserver-kscs00201-
er.go:255] "Failed to trigger a manual run" probe="Readiness"
~
~
root@kscs00201-master:~# vim /var/lib/kubelet/config.yaml
```

```
apiVersion: kubelet.config.k8s.io/v1beta1
authentication:
  anonymous:
    enabled: false
  webhook:
    cacheTTL: 0s
    enabled: true
  x509:
    clientCAFile: /etc/kubernetes/pki/ca.crt
authorization:
  mode: Webhook
  webhook:
    cacheAuthorizedTTL: 0s
    cacheUnauthorizedTTL: 0s
cgroupDriver: systemd
clusterDNS:
~
~
root@kscs00201-master:~# vim /var/lib/kubelet/config.yaml
root@kscs00201-master:~# vim /var/lib/kubelet/config.yaml
root@kscs00201-master:~# vim /etc/kubernetes/manifests/etcd.yaml
root@kscs00201-master:~# systemctl daemon-reload
root@kscs00201-master:~# systemctl restart kubelet.service
root@kscs00201-master:~# systemctl status kubelet.service
```



```
● kubelet.service - kubelet: The Kubernetes Node Agent
     Loaded: loaded (/lib/systemd/system/kubelet.service; enabled; vendor preset: enabled)
    Drop-In: /etc/systemd/system/kubelet.service.d
             └─10-kubeadm.conf
     Active: active (running) since Fri 2022-05-20 14:22:29 UTC; 4s ago
       Docs: https://kubernetes.io/docs/home/
   Main PID: 135849 (kubelet)
      Tasks: 17 (limit: 76200)
     Memory: 38.0M
     CGroup: /system.slice/kubelet.service
             └─135849 /usr/bin/kubelet --bootstrap-kubeconfig=/etc/kubernetes/bootstrap-kub>

May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330232  135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330259  135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330304  135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330354  135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330378  135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330397  135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330415  135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330433  135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330452  135849 reconciler.>
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330463  135849 reconciler.>
lines 1-22/22 (END)
May 20 14:22:30 kscs00201-master kubelet[135849]: I0520 14:22:30.330463  135849 reconciler.>
root@kscs00201-master:~#
root@kscs00201-master:~#
root@kscs00201-master:~#
root@kscs00201-master:~# exit
logout
Connection to 10.240.86.194 closed.
candidate@cli:~$
```

Question: 3

Create a PSP that will prevent the creation of privileged pods in the namespace.
Create a new PodSecurityPolicy named prevent-privileged-policy which prevents the creation of privileged pods.
Create a new ServiceAccount named psp-sa in the namespace default.
Create a new ClusterRole named prevent-role, which uses the newly created Pod Security Policy prevent-privileged-policy.
Create a new ClusterRoleBinding named prevent-role-binding, which binds the created ClusterRole prevent-role to the created SA psp-sa.
Also, Check the Configuration is working or not by trying to Create a Privileged pod, it should get failed.

Answer: See the Explanation below.

Explanation:
Create a PSP that will prevent the creation of privileged pods in the namespace.

$ cat clusterrole-use-privileged.yaml
---
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole

```
metadata:
  name: use-privileged-psp
rules:
- apiGroups: ['policy']
  resources: ['podsecuritypolicies']
  verbs:     ['use']
  resourceNames:
  - default-psp
---
  apiVersion: rbac.authorization.k8s.io/v1
  kind: RoleBinding
  metadata:
    name: privileged-role-bind
    namespace: psp-test
  roleRef:
    apiGroup: rbac.authorization.k8s.io
    kind: ClusterRole
    name: use-privileged-psp
  subjects:
  - kind: ServiceAccount
    name: privileged-sa
$ kubectl -n psp-test apply -f clusterrole-use-privileged.yaml
```

After a few moments, the privileged Pod should be created.

Create a new PodSecurityPolicy named prevent-privileged-policy which prevents the creation of privileged pods.

```
apiVersion: policy/v1beta1
kind: PodSecurityPolicy
metadata:
  name: example
spec:
  privileged: false  # Don't allow privileged pods!
  # The rest fills in some required fields.
  seLinux:
    rule: RunAsAny
  supplementalGroups:
    rule: RunAsAny
  runAsUser:
    rule: RunAsAny
  fsGroup:
    rule: RunAsAny
  volumes:
  - '*'
```

And create it with kubectl:

```
kubectl-admin create -f example-psp.yaml
```

Now, as the unprivileged user, try to create a simple pod:

```
kubectl-user create -f- <<EOF
apiVersion: v1
kind: Pod
metadata:
  name: pause
spec:
  containers:
    - name: pause
      image: k8s.gcr.io/pause
EOF
```

The output is similar to this:

```
Error from server (Forbidden): error when creating "STDIN": pods "pause" is forbidden: unable to validate against any pod security policy: []
```

Create a new ServiceAccount named psp-sa in the namespace default.

```
$ cat clusterrole-use-privileged.yaml
---
apiVersion: rbac.authorization.k8s.io/v1
kind: ClusterRole
metadata:
  name: use-privileged-psp
rules:
- apiGroups: ['policy']
  resources: ['podsecuritypolicies']
  verbs:     ['use']
  resourceNames:
  - default-psp
---
  apiVersion: rbac.authorization.k8s.io/v1
  kind: RoleBinding
  metadata:
    name: privileged-role-bind
    namespace: psp-test
  roleRef:
    apiGroup: rbac.authorization.k8s.io
    kind: ClusterRole
    name: use-privileged-psp
  subjects:
  - kind: ServiceAccount
    name: privileged-sa
$ kubectl -n psp-test apply -f clusterrole-use-privileged.yaml
```

After a few moments, the privileged Pod should be created.

Create a new ClusterRole named prevent-role, which uses the newly created Pod Security Policy prevent-privileged-policy.

```
apiVersion: policy/v1beta1
```

```
kind: PodSecurityPolicy
metadata:
  name: example
spec:
  privileged: false  # Don't allow privileged pods!
  # The rest fills in some required fields.
  seLinux:
    rule: RunAsAny
  supplementalGroups:
    rule: RunAsAny
  runAsUser:
    rule: RunAsAny
  fsGroup:
    rule: RunAsAny
  volumes:
  - '*'
```

And create it with kubectl:

```
kubectl-admin create -f example-psp.yaml
```

Now, as the unprivileged user, try to create a simple pod:

```
kubectl-user create -f- <<EOF
apiVersion: v1
kind: Pod
metadata:
  name: pause
spec:
  containers:
    - name: pause
      image: k8s.gcr.io/pause
EOF
```

The output is similar to this:

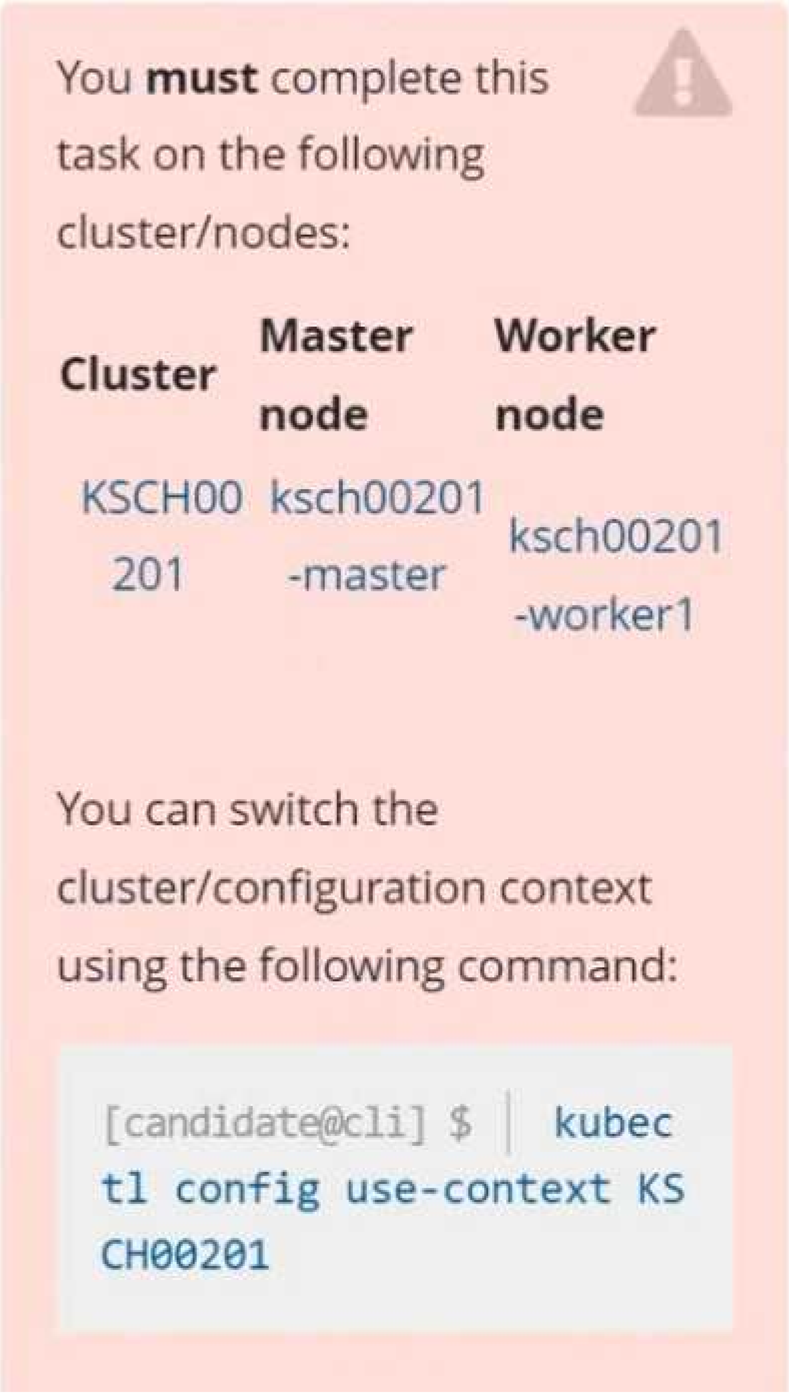
```
Error from server (Forbidden): error when creating "STDIN": pods "pause" is forbidden: unable to
validate against any pod security policy: []
```

Create a new ClusterRoleBinding named prevent-role-binding, which binds the created ClusterRole prevent-role to the created SA psp-sa.

```
apiVersion: rbac.authorization.k8s.io/v1
# This role binding allows "jane" to read pods in the "default" namespace.
# You need to already have a Role named "pod-reader" in that namespace.
kind: RoleBinding
metadata:
  name: read-pods
  namespace: default
subjects:
# You can specify more than one "subject"
- kind: User
  name: jane # "name" is case sensitive
  apiGroup: rbac.authorization.k8s.io
```

```
roleRef:
  # "roleRef" specifies the binding to a Role / ClusterRole
  kind: Role #this must be Role or ClusterRole
  name: pod-reader # this must match the name of the Role or ClusterRole you wish to bind to
  apiGroup: rbac.authorization.k8s.io

apiVersion: rbac.authorization.k8s.io/v1
kind: Role
metadata:
  namespace: default
  name: pod-reader
rules:
- apiGroups: [""] # "" indicates the core API group
  resources: ["pods"]
  verbs: ["get", "watch", "list"]
```

Question: 4



You **must** complete this task on the following cluster/nodes:

Cluster	Master node	Worker node
KSCH00201	ksch00201-master	ksch00201-worker1

You can switch the cluster/configuration context using the following command:

```
[candidate@cli] $ kubectl config use-context KSCH00201
```

Context

A Role bound to a Pod's ServiceAccount grants overly permissive permissions. Complete the following tasks to reduce the set of permissions.

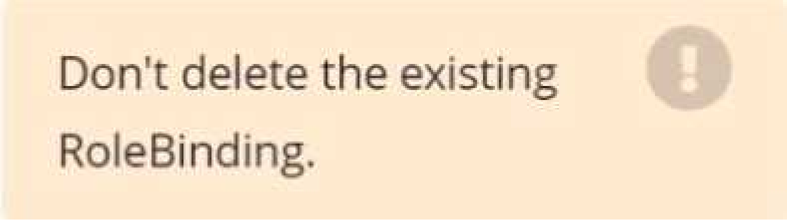
Task

Given an existing Pod named web-pod running in the namespace security.

Edit the existing Role bound to the Pod's ServiceAccount sa-dev-1 to only allow performing watch operations, only on resources of type services.

Create a new Role named role-2 in the namespace security, which only allows performing update operations, only on resources of type namespaces.

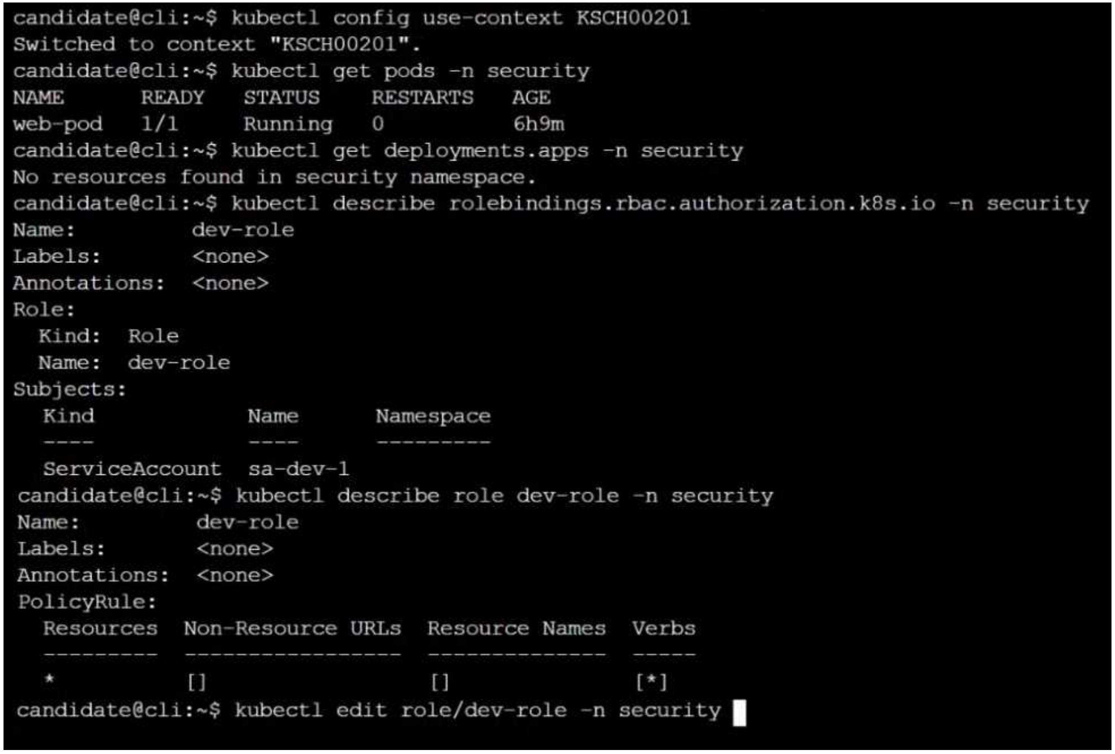
Create a new RoleBinding named role-2-binding binding the newly created Role to the Pod's ServiceAccount.



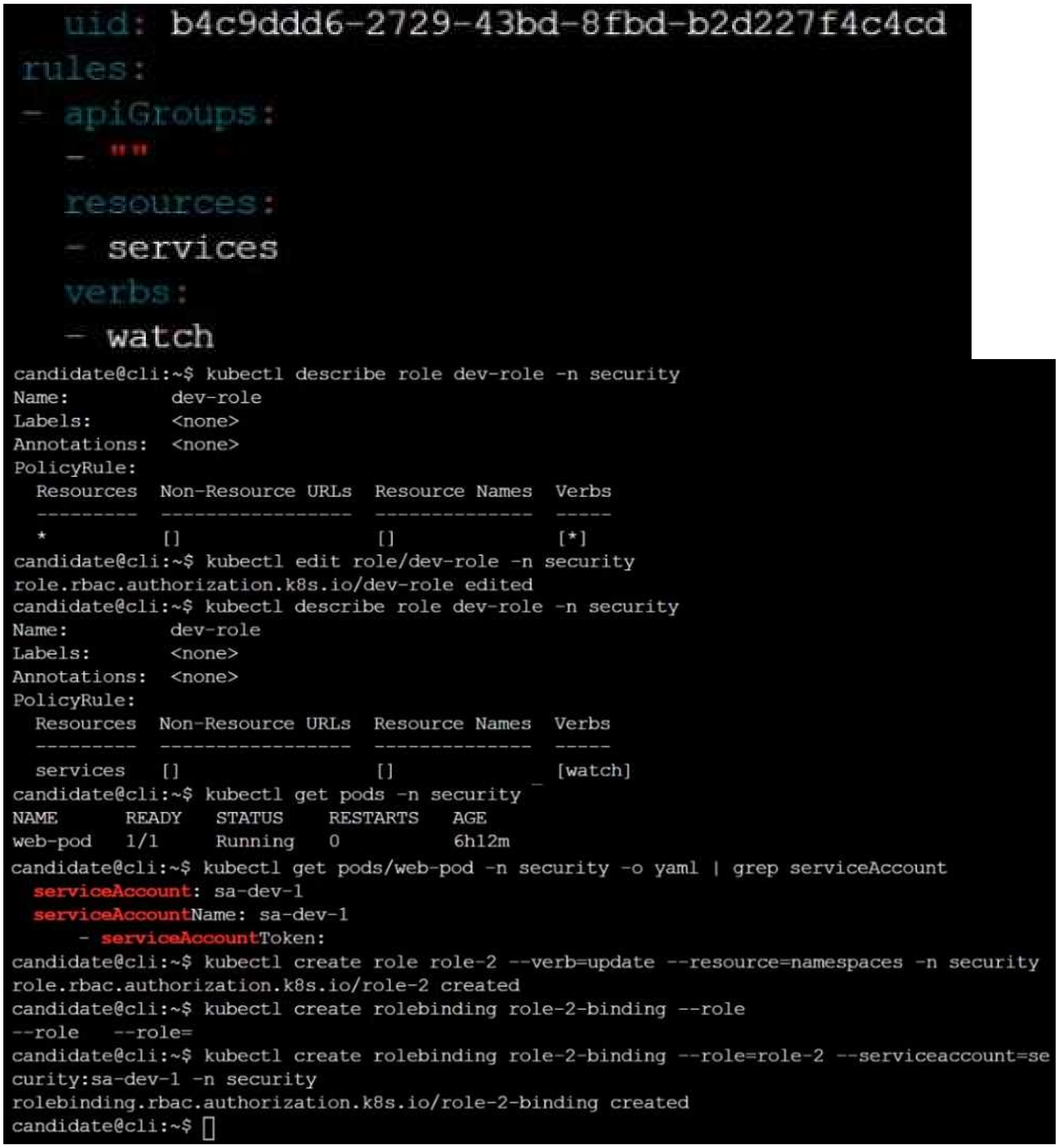
Don't delete the existing RoleBinding.

Answer: See explanation below.

Explanation:



```
candidate@cli:~$ kubectl config use-context KSCH00201
Switched to context "KSCH00201".
candidate@cli:~$ kubectl get pods -n security
NAME      READY   STATUS    RESTARTS   AGE
web-pod   1/1     Running   0          6h9m
candidate@cli:~$ kubectl get deployments.apps -n security
No resources found in security namespace.
candidate@cli:~$ kubectl describe rolebindings.rbac.authorization.k8s.io -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
Role:
  Kind:  Role
  Name:  dev-role
Subjects:
  Kind            Name      Namespace
  ----            ----      ---------
  ServiceAccount  sa-dev-1
candidate@cli:~$ kubectl describe role dev-role -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
PolicyRule:
  Resources  Non-Resource URLs  Resource Names  Verbs
  ---------  -----------------  --------------  -----
  *          []                 []              [*]
candidate@cli:~$ kubectl edit role/dev-role -n security
```



```
  uid: b4c9ddd6-2729-43bd-8fbd-b2d227f4c4cd
rules:
- apiGroups:
  - ""
  resources:
  - services
  verbs:
  - watch
candidate@cli:~$ kubectl describe role dev-role -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
PolicyRule:
  Resources  Non-Resource URLs  Resource Names  Verbs
  ---------  -----------------  --------------  -----
  *          []                 []              [*]
candidate@cli:~$ kubectl edit role/dev-role -n security
role.rbac.authorization.k8s.io/dev-role edited
candidate@cli:~$ kubectl describe role dev-role -n security
Name:         dev-role
Labels:       <none>
Annotations:  <none>
PolicyRule:
  Resources  Non-Resource URLs  Resource Names  Verbs
  ---------  -----------------  --------------  -----
  services   []                 []              [watch]
candidate@cli:~$ kubectl get pods -n security
NAME      READY   STATUS    RESTARTS   AGE
web-pod   1/1     Running   0          6h12m
candidate@cli:~$ kubectl get pods/web-pod -n security -o yaml | grep serviceAccount
  serviceAccount: sa-dev-1
  serviceAccountName: sa-dev-1
    - serviceAccountToken:
candidate@cli:~$ kubectl create role role-2 --verb=update --resource=namespaces -n security
role.rbac.authorization.k8s.io/role-2 created
candidate@cli:~$ kubectl create rolebinding role-2-binding --role
--role   --role=
candidate@cli:~$ kubectl create rolebinding role-2-binding --role=role-2 --serviceaccount=se
curity:sa-dev-1 -n security
rolebinding.rbac.authorization.k8s.io/role-2-binding created
candidate@cli:~$ 
```

Question: 5

Enable audit logs in the cluster, To Do so, enable the log backend, and ensure that
1. logs are stored at /var/log/kubernetes-logs.txt.
2. Log files are retained for 12 days.
3. at maximum, a number of 8 old audit logs files are retained.
4. set the maximum size before getting rotated to 200MB
Edit and extend the basic policy to log:
1. namespaces changes at RequestResponse
2. Log the request body of secrets changes in the namespace kube-system.
3. Log all other resources in core and extensions at the Request level.
4. Log "pods/portforward", "services/proxy" at Metadata level.
5. Omit the Stage RequestReceived

All other requests at the Metadata level

Answer: See the explanation below:

Explanation:
Kubernetes auditing provides a security-relevant chronological set of records about a cluster. Kube-apiserver performs auditing. Each request on each stage of its execution generates an event, which is then pre-processed according to a certain policy and written to a backend. The policy determines what's recorded and the backends persist the records.
You might want to configure the audit log as part of compliance with the CIS (Center for Internet Security) Kubernetes Benchmark controls.

The audit log can be enabled by default using the following configuration in cluster.yml:

```
services:
  kube-api:
    audit_log:
      enabled: true
```

When the audit log is enabled, you should be able to see the default values at /etc/kubernetes/audit-policy.yaml

The log backend writes audit events to a file in JSONlines format. You can configure the log audit backend using the following kube-apiserver flags:
--audit-log-path specifies the log file path that log backend uses to write audit events. Not specifying this flag disables log backend. - means standard out
--audit-log-maxage defined the maximum number of days to retain old audit log files
--audit-log-maxbackup defines the maximum number of audit log files to retain
--audit-log-maxsize defines the maximum size in megabytes of the audit log file before it gets rotated
If your cluster's control plane runs the kube-apiserver as a Pod, remember to mount the hostPath to the location of the policy file and log file, so that audit records are persisted. For example:

```
    --audit-policy-file=/etc/kubernetes/audit-policy.yaml \
    --audit-log-path=/var/log/audit.log
```